

Railway Age Gazette

Including the Railroad Gazette and the Railway Age

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POSTMASTER GENERAL HITCHCOCK, in his recommendation that the federal government buy all the telegraph lines of the country and operate them in connection with the postoffices has made three mistakes. First, he neglected to secure the co-operation of the president, and so has alienated friends in a cause which cannot get along without all the friends that can be got hold of. Second, he is careless of his facts. Government telegraphs which give such marvelously low rates are not profitable; the British lines have been maintained in part by large issues of government bonds, a burden on the tax payer. It is, probably, a mistake of fact, also, to assume that we have in this country many postoffices where there ought to be a telegraph office, to accommodate people now needing it. The telephone has met this need, and met it better than the telegraph could do. Thirdly, he is behind the times. His proposition to economize by having one person tend the postoffice and the telegraph office has been forestalled by the Western Union in its consolidation of telegraph and telephone offices. The Western Union is striving to make this improvement efficiently and economically, being kept alert by a lively competitor, the Postal Telegraph Company. A government bureau, possessing a monopoly, would lack this incentive.

SUBJECT to final revisions by the electrical department of the company, which are not likely to change much the original computations, the extension of electric service over the New Haven's four tracks from Stamford to New Haven (39.75 miles) is now clearly in sight and ordered by the company's directors. Unless unlooked for financial obstacles should ensue it seems reasonably certain that the end of the present year will find electric service with complete exclusion of steam on the 73 miles between the Grand Central station and New Haven, and applied to both passenger and freight traffic. The total cost of the extension, including a considerable purchase of, electric freight engines will be about \$7,000,000. The electric passenger service between New York and Stamford has been operated at a considerable loss as compared with steam, but due largely to the maintenance of the "mixed" service and the use of the power in practically one direction only from the Cos Cob station. With the extension to New Haven operated the official forecast outlines great economies over steam from unification of service, economies in the case of engines, extensive service in two directions without a new power house, large economies in switching and obvious economies in fuel. The end of the year 1913, and very likely a date earlier will see these forecasts tried out. Meanwhile it is to be recalled that the New Haven electric plan includes also the 74 miles of track of the New York, Westchester & Boston. With a mileage of about 150 miles thus under electric operation and a trackage of about 4 times those figures, the magnitude and significance of the New Haven's electric enterprise are apparent. President Mellen's prophecy of a few years ago that results would also be "revolutionary" of steam business on high traffic lines will await ulterior demonstration.

THE great advantage of increasing the capacity of locomotives without increasing the weight is becoming quite generally recognized as the limits of weight are being approached. Any such increase in capacity means greater ton-mileage with a comparatively small increase in operating expense. Advantage is being taken of the different devices which make for greater fuel and steam economy, and the weight of various parts of the locomotive is being reduced to a minimum, in order to increase the size and steaming capacity of the boiler. It is, therefore, strange, when a road has gone to considerable expense to thus improve the condition of its power, to hear a motive power officer enthusiastically exclaim: "Those new engines are great! Why, they can pull over that heavy grade on the X Y Z division with 100 tons more than our standard engines and blow-off steam all the way." The strange part is to find that "blowing-

off steam" is not intended as a figure of speech, but that it is literally true that in some instances the engineers are allowed to do it a considerable amount of the time. Although on many roads emphasis is constantly being laid on the rapid rate at which coal is wasted when this process is going on, it seems almost impossible to control it. Various suggestions have been made from time to time as to how the popping of the safety valves can be reduced to a minimum. These range from the attachment of a shrill whistle to the pop valve to placing the valve underneath the engineer's seat box. The most practical device thus far used seems to be a clock attachment, such as was described in a recent issue of the *Railway Age Gazette*, which records the actual time that the valve blows-off while the engine is making a trip. Conditions on some roads are such that radical steps should be taken to check this evil.

ATTENTION is called in a bulletin issued by the bureau of explosives of the American Railway Association to the need for the exercise of the greatest vigilance on the part of railway men to guard against a common and dangerous practice which vitally affects the public safety. It has come to the attention of the bureau that many users of explosives, and especially miners ignorant of the English language or of the requirements of the federal laws, are in the habit of including packages of explosives in baggage checked in the usual way on passenger trains or in packages of household furniture shipped by freight. The law strictly forbids concealed shipments of explosives, or their transportation on passenger trains in any circumstances. Explosives must be packed in their regular shipping containers, which must be correctly marked and accompanied by proper shipping orders. The penalties provided for violations of the statute are severe, the maximum being a fine of \$2,000, or imprisonment for 18 months, or both. In some instances it is reported that miners have taken kegs of blasting powder, and even packages of loose sticks of dynamite mixed with blasting caps, all wrapped in loose paper packages, into smoking cars. Washtubs and barrels supposed to contain only household goods have been found to contain loose powder and sticks of dynamite. Many violations of the law of this kind have been reported, and in several cases convictions have been secured. The bureau of explosives deserves credit for having already brought about a wholesome improvement in the conditions attendant upon the transportation of explosives and other dangerous articles. Such reckless handling as is described above is peculiarly difficult of detection, and the efforts of Chief Inspector B. W. Dunn and his assistants can only be made successful by the heartiest sort of co-operation on the part of the railway companies. Many roads are rendering material assistance by giving the subject wide publicity among their own employees, without whose constant watchfulness little can be accomplished.

IF the assumptions by Mr. Gardiner, in his letter printed on another page, are correct, he might well be justified in asking "who would be left to oppose government ownership?" The facts, however, fail to bear him out. Mr. Gardiner's first assumption that the largest part of railway mileage of the country was built for securing profit from building and not profit from operation is a very broad statement—probably entirely too broad. In the South it is more nearly true, probably than in any other part of the country, however. Mr. Gardiner's experience is that a railway needs 5 per cent. of its actual value to put into the property each year for improvements, and his contention is that railways built and financed as they have been in the past will not be able to put this amount into the property each year for improvements, because they will not be able to raise new capital. The obvious answer is that railways have been able to raise new capital to make very extensive permanent improvements to their property. Let us take the Southern Railway. On June 30, 1900, it was capitalized, exclusive of equipment trust certificates, but inclusive of securities of lease-hold estate at \$49,306 per mile operated. At the end of June, 1910,

the company was capitalized at \$63,683 per mile operated, computed on the same basis. This is an increase of capitalization of 2.9 per cent. per year, on *capitalization*, as against Mr. Gardiner's estimated necessary 5 per cent. on actual cost. Moreover, the Southern Railway is largely an aggregate of lines built and financed very much on the plan suggested by Mr. Gardiner with numerous first lien mortgages and stock, consisting largely of the capitalization of hoped-for profit. Notwithstanding this, the Southern Railway has been able to spend the necessary sums from capital account for permanent improvements and to raise these sums by the sale of securities not a first direct lien on the rails. Furthermore, the Southern Railway has now facilities sufficient to handle not only any reasonable increase in traffic that may be expected, but (with the exception of equipment) even three or four times the traffic that is being carried on most of its lines at present. As to motive power, with a sharp return to prosperity, and largely increased shipments, especially through the West—the railways might quite possibly find themselves badly in need of more locomotives and possibly cars, but the car surplus and shortage report of the American Railway Association, printed this week, in our news section, hardly confirms this surmise, as far as cars are concerned. Mr. Gardiner speaks of a return to prosperity measured by an output by the steel plants of 90 per cent. of capacity. The United States Steel Corporation is now operating at about 89 per cent. of capacity, and some of the more important independent companies at 85 per cent. of capacity. Nevertheless, there is a surplus of freight cars of over 100,000. Mathematicians can prove conclusively that a baseball cannot be curved by a pitcher, but the fact remains that curves are easily pitched. It might be possible to so twist figures as to show that the railways of the United States cannot possibly raise the capital needed for improvement during the next ten years, but the same method used ten years ago would have shown the same thing, and one is inclined to trust experience rather than hypothetical figures. It is not because Mr. Gardiner's views are those of a shipper, but are those of a theorist that we question them.

NOMINATED FOR THE ANANIAS CLUB.

IN an article entitled, *The Truth about Railway Accidents*, published in the *Railway Age Gazette* of December 8, page 1166, numerous false statements regarding the railways of the United States, made by Charles Edward Russell, in an article entitled, *Speed*, published in the *Hampton-Columbian Magazine* for October, were exposed. We have secured information from the Interstate Commerce Commission completely refuting certain of the assertions made in the article referred to with ultra-positiveness. The assertions referred to appear in the following sentences:

"Various gentlemen connected with the operating, publicity and press agent departments of our national slaughter houses will make, of course, the usual perfervid protests at my statement that only three railways in the United States use the absolute block. To save them needless excitement, I may observe here that I do not get my information about this from the press bureaus, but from the office of the Interstate Commerce Commission, which is a much better source. Operating departments have now become so large and so complicated that sometimes the worthy young gentlemen employed in them do not know what is what on their own railways."

The *Railway Age Gazette* knew that the statements above quoted were untrue, and it did not believe that the Interstate Commerce Commission had given out any such misinformation as was attributed to it. We, therefore, wrote to Judson C. Clements, chairman of the commission, inquiring about the matter, and received from him under date of December 22 a letter, in which he said in part:

"In order to guard against any possible erroneous statement in answering you I wrote to Mr. Russell, asking him for the source of his information, and under date of November 15 I received an acknowledgment from him, in which it was stated:

"I hardly have need to assure you of my desire to assist you in every way in my power; but in view of the nature of the interests antagonized by that article you will not think it either strange or improper if I ask

concerning the purpose of the inquiry and what use is intended of the information."

"To this I replied that the purpose of my inquiry was to obtain information upon which to base a reply to a letter received from you, but I have heard nothing further from him. I now write to say that I am unable to locate any utterance emanating from the commission justifying the statement of Mr. Russell quoted by you."

Subsequently to writing the above, Mr. Clements continued his investigation with results which are set forth in the following letter written by him to the *Railway Age Gazette* on January 12:

"Again referring to the correspondence which originated with your letter of November 2, quoting from an article by Charles Edward Russell entitled 'Speed,' I have to say that effort has been made to locate the source of Mr. Russell's information.

"Mr. Russell declines to give the name of the one by whom the statement was made and I can therefore only say that it was never made by the commission, and was not made by any person by authority of the commission, or by any person who was authorized to speak for the commission.

"I may add that the information which we have relative to operation of block signal systems on our railways indicates that the statement in Mr. Russell's article, that only three railways in the United States use the absolute block, is very inaccurate and incorrect."

Mr. Clements' letter indicates with sufficient clearness the "shorter and uglier word" which in similar circumstances a former president of the United States would apply to the author of "Speed." We hereby nominate Mr. Russell for life membership in the Ananias club. We note that the *Hampton-Columbian Magazine* has been revived and that the leading article in its January issue is signed by Mr. Russell. We, therefore, also nominate the *Hampton-Columbian Magazine* for life membership in the same organization. We know of no man and no publication that so thoroughly merit a high place on its roster and the most distinguished honors of its own peculiar kind that it can bestow.

SOME QUESTIONS IN RAILWAY EQUITIES.

THE New York Central in 1898 took a step by which it in effect became a proprietor of the Lake Shore property. The Lake Shore had been paying 6 per cent. dividends on its \$50,000,000 of outstanding stock. The New York Central offered the Lake Shore stockholders what was tantamount to a guaranteed dividend of 7 per cent. It offered, that is to say, in the ratio of 2 to 1 its own 3½ per cent. debenture bonds for Lake Shore stock. To the Lake Shore stockholder the plan was attractive. It increased his return by 1 per cent. It substituted the pledge of a strong dividend paying corporation for the, at least theoretical, uncertainties of the dividend of another corporation. And, as additional security, the Lake Shore stock surrendered was to be held as collateral for the guarantee. But there was another inducement to the exchange of Lake Shore stock for "New York Central-Lake Shore collateral trust" debentures not now commonly remembered. It was announced at the time that the large Vanderbilt holdings of Lake Shore had joined in the plan, thus not only practically assuring New York Central control of the Lake Shore, but placing the non-assenting stockholder in the position of a minority share owner, with attendant risks—a risk which the experiences of minority stockholders in other railways had shown to be considerable.

The plan went through with substantial success—at least from the New York Central viewpoint. Holders of about \$45,000,000 of Lake Shore stock surrendered their shares in exchange for about \$90,000,000 of the collateral trust bonds. Holders of about \$5,000,000 of stock did not surrender it, and in the outcome have shown that they had superior wisdom or courage or both. For the Lake Shore dividend, based moreover, on earnings, has been raised to 18 per cent., when the New York Central has needed the money. The Lake Shore shareholder who entered into the scheme proposed has had to content himself with 7 per cent., while he has seen the non-assenting holder draw 18. The New York Central has, in a sense, penalized its coadjutors and rewarded the outsiders. The coadjutors have seen their own holding—measured in double the market price of their bonds—selling at about 165, while the

outstanding Lake Shore stock has been quoted far up and indefinitely in the hundreds. Based on market price, the profits of the New York Central are obviously very great. Calling Lake Shore stock 400, the shares for which, in par of the bonds, \$90,000,000 was paid, show a net profit for the New York Central of the same amount.

The case cited raises questions in equities and ethics. Assuming that the New York Central had fore-knowledge of the Lake Shore earning power and of its own policy of using that power for dividends, how far was it justified in driving so sharp a bargain with the old shareholders? It may be said that it was dealing with a corporation and interests technically, at least, extraneous to itself and that it was acting in the interest of its own shareholders. But, on the other hand, it may be urged that its relations with the Lake Shore as a "Vanderbilt road" were not only fiduciary, but intimate, if not controlling, and certainly such as to give it the "inside knowledge" that induced the exchange of stock for bonds. It may be contended also that the *caveat emptor* principle applies to the case, that the Lake Shore stockholders took their chances, and that they neglected due study of their property and estimate of its value and futurities. This line of reasoning is partly justified by the theory of fear inspired by the perils of minority stockholding. The question is now mainly academic, as well as the ulterior question as to how reparation could be made if a wrong has been done. The New York Central has now sent a circular to the collateral trust bondholders asking them to exchange their bonds for a new second mortgage security as a legal condition precedent to the consolidation of the two companies. A study in investment mentality will be afforded the spirit in which the bondholders receive the proposition.

The consent of three-quarters of the bonds is legally required for the consolidation. Assuming that consent to be obtained, there is beyond another question in the railway equities. What terms can be demanded successfully by the holders of the outstanding \$5,000,000 of Lake Shore stock for surrender of their shares? The rule of morals in such cases is that there should be compulsion on neither side—that on the part of the absorbing corporation there should not be a "freeze-out," nor on the part of the outstanding stockholders the "strike" for an exorbitant price. In practice, such cases usually get to the courts for an appraisal as a matter of the stockholder's constitutional right. And in the Offield case the United States Supreme Court has maintained the power of a state to determine the conditions—under appraisal—for condemnation of minority shares. The minority Lake Shore interest in this instance represents a market value of some \$20,000,000 or more—enough by its magnitude alone to excite keen interest in the final adjustment of the equities.

INTELLIGENT AGITATION OF THE GRADE CROSSING PROBLEM.

EDWARD S. CORNELL, secretary of the National Highways Protective Association, speaking of recent records of fatalities at highway grade crossings, says, according to the *New York Herald*, that it is useless to make good roads, so long as the old grade crossing exists. Indeed, with the better road surface the speed of vehicles is likely to be higher, increasing the danger. Automobiles, running faster than horses have, no doubt, been caught by trains at crossings, when the slower moving horse would have escaped. Mr. Cornell has given voice to a very significant suggestion. The good-roads propaganda is becoming popular in all of the older states. New York State has appropriated millions for roads (four and a half millions in three years), while for the elimination of grade crossings, the need of which was recognized years ago, only an average of \$79,149 yearly has been appropriated during the past fourteen years. No one can deny the economy of good roads for the farmer, but the farmer (in the legislature) should take care to economize with equal discretion in all directions. It is important for him to safeguard his life at railway crossings as well as to

cheapen the cost of carrying his grain to market; and the point is specially pertinent when, as sometimes happens, the tax money which he is spending on good roads is found to benefit pleasure riders in automobiles more than it eases the pull on the front draw bar of the farmer's wagon. Such heavy financial burdens as those of good roads and safe railway crossings should be made to bear as equitably as possible on all those whom the improvement benefits.

Another significant utterance on the grade crossing question is that in the report of the New Jersey Public Utilities Commission, given in our last issue, page 58, to the effect that cities and towns ought to bear a share of the burden of the necessary improvements in order to keep the sentiment of the citizens alert, intelligent and conservative. The universal tendency to shove tax burdens off upon somebody else is particularly persistent in the case of a burden so discouraging as this one, and public officers can do no better service to the people than to call attention to the cold realities of such problems. There has been a movement in New Jersey aiming to compel the abolition of all grade crossings at the expense of the railways alone, the state and the towns paying nothing. The railways, being forced to add new main tracks and to improve grades and ease curves, without waiting for the slow movements of city councils, have done millions of dollars' worth of work in this direction already, relieving the cities, only to be rewarded by having their taxes increased; but there can be no equity in forcing them to go further. Any favoring of the public in this direction must be made up in another, by deferring needed reductions of fares or freight rates. There is no way to get around the fact that the public must ultimately bear the principal share of the burden, for the railways derive their income from the public. As the New Jersey board suggests, we shall do well to consider the situation in those countries where the railways are owned and operated by the state. With public ownership the elevation of tracks is a public charge in its entirety.

Still another clear declaration is that of Governor Dix, of New York, who says:

"The increasing frequency of accidents at grade crossings, the peril and inconvenience to which the public are subjected at such crossings, the increasing traffic upon both the railways and highways, urgently demand that liberal appropriations should be made to carry on the work of eliminating such crossings. There are in this state, outside of the city of New York, upwards of 8,500 such crossings, a great proportion of which are a constant menace to the safety of the public."

"Liberal" appropriations in New York must mean a large sum. Massachusetts, with less than one-fourth as many crossings as New York, spent over \$500,000 yearly for twenty-one years. This out of the state treasury. The cities and towns have spent large sums also, and the railways twice as much as state, cities and towns combined, the total expenditures since 1890 aggregating about \$35,000,000. The New York legislature cannot do justice to the Governor's recommendation by making an appropriation after a perfunctory half hour's discussion; the need is for a careful study of the whole state budget, with a view to eliminating every unnecessary expenditure, thus making possible a large appropriation for crossings. With the increase of electric interurban railways, and (with the improvement of such railways) the growth in frequency and speed of electric cars, the grade-crossing problem is becoming larger instead of smaller, and legislatures, courts and people are bound to deal with the question most seriously. Hitherto there has been good ground for the assertions of Commissioner G. W. Dickinson, of Michigan, in his report to the commissioners' convention at Washington last October: "The public has been appealed to in vain. Commissions have recommended legislative action, only to have their recommendations ignored . . . The spirit of 'taking the chance' seems to have become almost habitual. . . . Some states permit the establishment of grade crossings. The public agrees that something ought to be done, but when it comes to bearing a fair share of the expense the public demurs, or loses interest." The grade-crossing problem is no summer-school campaign. It is still full of difficult questions.

A NOVEL PLAN FOR CHANGING RAILWAY CONTROL.

IN an article in *McClure's Magazine* for January, William W. Cook, one of the foremost authorities in this country on corporation law, outlines and advocates a novel plan for bringing all the railways of the United States under a single control. His scheme, he believes, would have all the advantages of both public and private ownership and management, and none of the disadvantages of either.

He proposes the organization under a federal charter of a holding company with an authorized capitalization of \$25,000,000,000. On such of its stock as should be sold to the public from time to time the government would guarantee dividends of 3 per cent. This, he thinks, would make the stock marketable at par, like government bonds. He says that ten large systems now practically control the railway transportation of the country. These are the Pennsylvania Railroad, the New York, New Haven & Hartford, the New York Central & Hudson River, the Southern, the Union Pacific, the Chicago & North Western, the Chicago, Milwaukee & St. Paul, the Northern Pacific, the Great Northern and the Atchison, Topeka & Santa Fe. He estimates the market value of their stock at \$2,844,484,526. By raising this sum, by the sale of its stock at par, the holding company could buy all the stock of the railways named and make itself the recipient of their dividends aggregating \$151,818,393 per year. After paying 3 per cent. dividends on its outstanding capitalization, amounting to \$85,334,535, the holding company would have left as its profit the difference, \$66,483,858. "This large profit," Mr. Cook states, "could be applied to improvements or be consumed by a reduction in rates. In either case it would be a great saving to the people."

He proposes to capitalize the holding concern for the large sum of \$25,000,000,000, because he estimates that "about \$15,000,000,000 would be needed to secure all the existing railway stocks and pay for the existing railway bonds as they became due; and the remaining \$10,000,000,000 would be issued from year to year to pay for future extensions and improvements." He would have the 25 original directors of the company named by Congress in its charter, their appointments being for life, and would empower them, with the approval of the president of the United States, and, perhaps, with that of the United States senate, also, to appoint their successors.

Mr. Cook thinks his plan would eliminate "Wall street domination," and the financial manipulation, unfair discrimination, etc., which he regards as great evils in railway management now, without producing the political complications and inefficient operation which he believes would result from government ownership. He assumes that under his scheme the operation of the individual railways would stay in the same hands as now, and would, therefore, continue to be efficient.

The twenty-five men who would compose the board of the holding company would be the keystone, and determine the success or failure of Mr. Cook's plan; for by voting the holding company's stock they would choose the directors of the operating companies; the directors of the operating companies would choose the executive officers of the railways; and upon the kind of executive officers who were appointed and the incentives they were given to do good work would depend how rates would be made, how economically and efficiently the properties would be run and what their earnings would be. Mr. Cook assumes the roads would continue to earn and pay their present dividends. But, of course, if they were ill managed they might not earn even 3 per cent.; in which case the government would have to raise by taxation the money to make good its dividend guarantee.

Is it probable, then, that the board of the holding company, chosen as suggested, would be so composed as to be competent to supervise honestly and wisely the operation, improvement and extension of the gigantic railway system of the United States? The first board would be elected by Congress. Most of the men who have the capacity and experience to equip them for directors are now connected with the railways either in that capacity or as executive officers. But if Congress adopted Mr. Cook's plan it would be primarily with the object of changing the influences

now governing railway management; and to accomplish this it would be apt to select men unlearned and unskilled in railway affairs. Indeed, it is not undue harshness, in view of the past history of public affairs in this country, to assume that they would be chosen for political rather than business reasons. If the first directors were chosen for such reasons so probably would their successors be. It is not likely that the directors of the holding company would select directors of the operating companies who would be essentially different from or superior to themselves. And if the directors of the operating companies were not good business men, and were not chosen because they were such, they would not be likely to select the executive officers of the railways regardless of political considerations and solely because of their experience and skill as railway men. If the executive officers were not chosen and retained or dismissed solely for business reasons the efficiency with which the railways were operated would deteriorate, which would result in poorer service or higher rates or reduced net earnings, or, perhaps, all of them.

Instead of having all the advantages and none of the disadvantages of both private ownership and government ownership, it would seem that Mr. Cook's plan would have few of the advantages and most of the disadvantages of both. There are many things to criticise in the existing method of selecting, and in the personnel of the directors of the roads of the United States. Too many of them live remote from the railways to whose boards they belong, and do not know their needs or the public sentiment along them. Too many are men of such large and varied affairs that they must performly perform their directorial duties perfunctorily. Too many are mere dummies of large interests in Wall street. But a large proportion of the members of most boards do have the knowledge and experience needful for their duties. Furthermore, directly or indirectly, they represent and are responsible to the stockholders, or at least to the dominant stockholders; and, therefore, they have a strong incentive to cause the roads to be operated skillfully, and may be turned out if they do not. The process of eliminating incompetent directors is sometimes painfully and wastefully slow; but it usually works itself out. Similarly, under government ownership the owners of the railways could call those who were charged with the duty of operating them to an accounting; although the difficulty they would encounter in doing so would be greater than that met by the present owners, and for this and other reasons under government ownership the managers would be likely to be given less opportunity for and incentive to good management than they have now.

Who, under Mr. Cook's plan, would be able to call the board of the holding company to an accounting if it did not satisfactorily perform its duties? Not the stockholders, because they would have nothing to do with choosing or removing the directors. Not the public through Congress or any other branch of the federal government, because after the first directors were appointed the board would be self-perpetuating. Mr. Cook would rely entirely on public sentiment to hold the directors up to intelligent and energetic work. But only in the long run does public sentiment pass wise and favorable judgment on the conduct of men who are handling large affairs. Seldom are the qualities that make a great administrator and those that win popularity combined in the same person. Furthermore, public sentiment in many cases influences the acts both of public men and of business men only because of their fear that if they disregard it the result will be their retirement, or legislation that will harm their business. Under Mr. Cook's scheme the directors of the holding company, who would be quasi-public men, could not, if they chose to defy public opinion, be punished or removed except, perhaps, by some slow and uncertain process of impeachment.

On the whole, Mr. Cook's plan will not appeal to many public men, or to many business men, as one that would satisfactorily solve the railway problem. Probably its solution is to be found only in either efficient private management under wise public regulation, or public ownership.

Letters to the Editor.

GOOD SERVICE IN DESPATCHERS' OFFICES.

SPOKANE, Wash., December 5, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have just read, in your issue of December 1, page 1140, an article credited to J. W. James, purporting to tell of "real life in the train despatcher's office" and showing up in vivid language the behavior of a supposed despatcher who was neglectful of his duty and ungentlemanly in his conduct toward the operators.

I desire to protest against the statements made in this article. I cannot believe that Mr. James correctly reflects conditions as they really exist. In all of the offices in which it has been my pleasure to labor I never yet have discovered a force of train despatchers who carried so lightly the responsibilities placed upon them. A quarter of a century ago I began as an operator and assistant despatcher on the Boston & Lowell at Boston. Since that time I have worked in the transportation departments of important railways at Lincoln, Minneapolis, Des Moines, Buffalo, Kansas City and Spokane; and I can testify that in none of these offices have I seen anything even approaching the nonsense related in the story you print.

The only redeeming feature of this document is its concluding sentence, which expresses vividly the contempt in which train despatchers are held by various other employees. The responsibility for this, I think, lies principally on those who are constantly harping on their demand that train despatchers be included as a part of the official staff. It seems to me that instead of doing good for train despatchers, this claim, maintained by some of our old friends, has worked to the detriment not only of the service, but of the individual as well. No man who has his heart properly in his work cares a rap whether he be called employee or officer. The result to be attained is to furnish satisfactory transportation to the railway's customers. In the selection of officers to direct the affairs of railways, train despatchers have no claims on the management that are superior to the ambitions and hopes of any other body of men, the chief consideration being always fitness for the position to be filled. The despatcher who sets himself with determination to satisfy his employer and to give the public good service will have no need of an organization to fight for him; chairmen of industrial committees will find themselves without an occupation.

STEPHEN H. BROWN.

GOVERNMENT OWNERSHIP INEVITABLE.

LAUREL, Miss., January 12, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have read with interest the several letters from railway officers published recently in the *Railway Age Gazette* in relation to present conditions and future prospects of American railways, and it occurs to me that perhaps your readers may be interested in the observations of a shipper.

It seems to me that if careful thought be given to the subject, the conclusion must be reached that there is little prospect that stockholders will hereafter receive any large benefits from their railway investments.

My experience with railway operations in connection with our lumber manufacturing business, also my acquaintance with railway properties particularly in the South, convinces me that on an average, money must annually be provided to the extent of over 5 per cent. of the actual value of the road for use in permanent improvements to the property.

Some of these improvements are: extension and enlargement of terminals, new and larger stations, double tracking and elevating tracks, additional side tracks, elimination of grade crossings, heavier rails and reduction of grades, additions to equipment.

The last item usually is cared for with equipment notes, falling due annually, which are quite different from long time bonds,

and must be liquidated out of earnings, and is not included in my estimate for cost of permanent improvements.

Referring to the history of railway construction in this country, it is well understood that the largest part of railway mileage now in existence was constructed for the purpose of securing profit from building and not for profit to be derived from operating. As a result of this policy, the first bonded indebtedness placed on the roads was enough to cover the entire cost of construction and equipment. An equal amount of stock was also issued which represented the promoter's equity or profit. If the road was well located and profitable as an operating proposition, the stock rapidly advanced in value, and if highly profitable, additional bond issues were laid on the road; the total capital stock and bonds represented the value of the road based on its earning capacity, and not on the actual cost of the property.

This method of early financing operates at present to prevent issuing additional first lien securities on the roads for the purpose of securing funds to pay for the improvements mentioned above, which are necessary to maintain the railways at a proper standard of efficiency and to meet the requirements of state and national commissions. The difficulty with most roads in securing additional money, by using long time bonds, is that, as above stated, practically all the roads have already issued such obligations to such an extent that the security for further issues on the same property is not deemed adequate by investors and consequently second mortgage bonds and the usual refunding bonds sell at such a large discount, if taken at all, that the roads cannot afford to issue them. Nor is it expedient to issue capital stock to provide funds for the above mentioned purposes. Frequently the stock is quoted below par or the issue of additional stock would reduce the value of that outstanding to below par.

The experience, during many years past, is that production of commodities and railway tonnage double every ten years and it is reasonable to expect that hereafter railway traffic should increase at about the above ratio. Practically everything produced is transported by rail, and production therefore will be confined to the capacity of the railways to handle tonnage.

During the past three or four years, addition to railway equipment has just about been offset by loss from retirement of worn out cars and engines, so that as relates to equipment there has been no improvement. As to the other items mentioned in the beginning of this letter, the railways are rapidly falling behind in providing them and to such an extent that should there be a revival of general business throughout the country during the next twelve months and should there be the increase in the volume of tonnage hoped for and expected by many (say to a basis of 90 per cent. of capacity of the steel plants), there will be such congestion of traffic and delay in transportation, with consequent forced extension of bank credits, that interest rates will reach prohibitive figures, similar to what occurred during the early part of 1907.

Congestion of traffic will largely increase operating costs and reduce operating income so that the railways will be unable to make improvements from operating profits or to secure funds from the sale of securities.

Prohibited from advancing rates to pay for increasing operating costs and with no prospect of saving any profit from operations to invest in improvements and with nothing but second or third class bonds or short time notes to sell, it will be impossible for the railways to secure sufficient funds for permanent improvements to increase their capacity to the extent necessary to handle the average annual increase of tonnage. It is imperative that the facilities for railway transportation be rapidly and vastly increased, or stagnation in business will result and to such an extent that the people will suffer financial loss. Should such congestion of traffic occur and continue for any great length of time, the dissatisfaction on the part of shippers will be so great that Congress will be appealed to for relief and with the demand that the government own and operate the roads.

When increased operating costs and the cost of such improvements as are absolutely necessary to be made have absorbed all of the net earnings of the roads, leaving nothing for dividends,

stockholders will be anxious to exchange their stocks and bonds for three per cent. government bonds.

Inability to secure further advances in wages will cause railway employees to favor government ownership.

Lack of adequate transportation facilities will cause shippers to favor government ownership.

Who will be left to successfully oppose the movement towards government ownership?

GEORGE S. GARDINER.

President, Eastman, Gardiner & Co.

THE STEEL PASSENGER CARS IN THE ODESSA WRECK ON THE ST. PAUL.

The rear-end collision on the Chicago, Milwaukee & St. Paul at Odessa, Minn., on December 12 was so destructive to the modern steel Pullman sleeper that considerable interest has been taken in the matter of the behavior of the cars, and we have obtained some illustrations of the wreck which show very clearly the condition of the equipment after the collision. Ten persons in the sleeper were killed and 11 injured. Passengers in the other portions of the trains were not injured. The dining car,



Fig. 1—Locomotive and Steel Sleepers—Left Side.

which was next to the sleeper, was not damaged beyond the kitchen, and that portion was not occupied.

The passenger train was made up of a Pacific type locomotive having a total weight with tender of 303,350 lbs. and one baggage car, one combination mail and express car, one coach, and one tourist sleeper. At the rear was a sleeping car built by the Pullman Company having its usual design of steel underframe, but with a $\frac{1}{8}$ in. steel plate side and wooden inside finish. Next to this was a steel dining car of the same construction, built by



Fig. 2—Locomotive and Steel Sleepers - Right Side.

the Pullman Company. These two cars were the only ones which were seriously damaged.

The conditions of the collision were roughly as follows: The manual block system is in operation at Odessa, the system extending from Junction Switch to Appleton, a distance of 20.6 miles. Two signal operators are maintained at Odessa, but there is no operator in the tower from 1:30 a. m. to 8 a. m. For some reason the operator when he vacated his place at 1:30 a. m. left the signal at "stop." The engineer of the passenger train, the

"Columbian" flyer, when it arrived at 3:32 a. m., observed the signal and stopped at the station. The flagman apparently utterly failed in his duty to go back and signal any approaching train, or to throw the switch to the passing track.

The train despatcher believing that the passenger train had advanced near the next station east, Appleton, gave orders to the following section of the train to proceed from Junction Switch to Appleton at regular speed. This second train was, therefore, running at high speed when it approached Odessa station and at 4:25 a. m. collided with the first section, which had just begun to move forward, and had proceeded about 30 ft. The second section was composed of a Pacific type locomotive of the same weight as the one on the first section and six loaded 30-ton special refrigerator cars 46 ft. long, each weighing 69,000 lbs., empty. Four cars were loaded with silk, and two cars with fish.

The general construction of the underframe and superstructure of the sleeping car and dining car were illustrated in the *Railway Age Gazette* of February 24, 1911, page 359. The underframe was the same as that which has been used in a large number of steel sleepers built by the Pullman Company, having center sills in the form of fish belly girders, 26 in. deep at the center, attached to a steel casting which forms the double body bolster and the platform and draft sills, the rolled portion of the center sill ending where it is riveted to the inner lugs of this casting.

The action of the cars at the time of the collision appears to

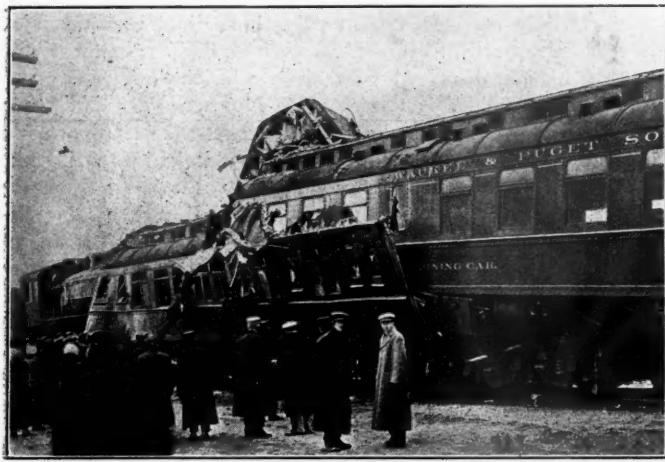


Fig. 3—Steel Dining Car and Front of Steel Sleeper.

have been as follows: The heavy locomotive, running at high speed with six heavily loaded freight cars, plunged into the rear of the sleeper, which was the smoking compartment, and splitting open the car entered as far as the rear of the steam cylinders. Although the car had wooden inside finish which was badly splintered no fire occurred, and this must be attributed to the use of steam heating and electric lighting, which do not require live flame in the light or live coal in the heater as in the old style methods. The cast steel bolster and platform at this end were broken and split apart as far as the center plate. This must have tended to raise the rear of the sleeper and depress the forward end, so that the pressure of the collision tended to raise the dining car underframe above that of the sleeper, producing a telescopic effect which is roughly illustrated in the sketch, showing how the six-wheel trucks were driven together and how the dining car entered the sleeper for one-third of its length.

The two underframes in this portion of the collision sliding past each other, were not very badly damaged, and the platform casting, the steel bolster and the center sills at the front end of the sleeper were almost intact, those of the dining car being in the same condition. The roof of one-third of the sleeping car was thrown clear up on top of the dining car and the sides of the sleeper split and spread apart, as shown clearly in the illustration. The almost complete destruction of the sleeping car and the cushioning effect of its telescoping with the dining

car absorbed so much of the impact of the collision that little damage was done to the remainder of the passenger train. Even the front end of the dining car retained its vestibule and buffers, and the platform, body bolsters and underframe at that end, without material injury. No one was injured in the cars in front of the dining car. Doubtless the fact that the first section was moving slowly made the collision less destructive than it would have been if the train had been standing with brakes set.

The damaged cars have been inspected by engineers interested in the design of steel passenger equipment, and various suggestions have been made as to further improvements in this class of equipment. The manifest weakness of the roof, as shown by its complete collapse in the collision with the dining car, has suggested stronger construction in that part of the car so as to make the resistance at the end plate more nearly proportional to that of the end sill. Very little, if any, criticism can be made of the strength of the center sills in these cars, as those under both dining car and sleeper are bent scarcely any and were not broken. It is evident that with this very strong construction the effect of telescoping in high speed collisions must be very disastrous, as the upper frame of the car is weak compared with the underframe; when they are in collision and telescope the weaker portion must suffer severely, and the illustrations of this wreck show the extent to which damage of this kind takes place in the strongest of modern steel equipment.

Some lessons are to be learned also in regard to the cost of repairs of steel equipment when badly damaged in this way. The sides of the sleeping car are so completely bent and warped out of shape, and the inside finish so destroyed, that there is scarcely any salvage, the steel center sills being about the only

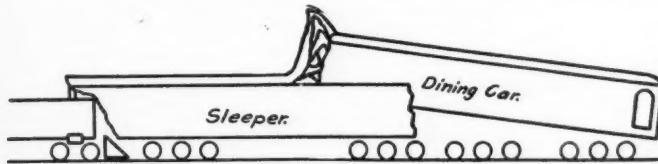


Fig. 4—Diagram Showing Position of the Rear Cars After the Odessa Wreck.

part which would not require renewal or heavy repairs. The $\frac{3}{8}$ in. steel plates forming the sides of the car and the steel angles forming the side sills are so badly distorted that it is doubtful whether it will pay to attempt to use them for renewals.

It will be remembered that the type of construction here involved is that which utilizes the long steel plate girder under the windows as a portion of the structure for carrying the load, and the side sills are made unusually light. If another type of car having heavy side sills had been used the same amount of destruction and distortion would have occurred, and the labor required to restore the side sills to normal condition would have been even greater. It must be concluded, therefore, that in accidents of this kind none of the various types of steel passenger car construction of equal weight have any particular advantage over wooden equipment so far as resistance to impact is concerned, and there is not much difference in the cost of repairs of the heavier parts of the construction. The trucks were driven along under the cars and were not very badly damaged. They were bunched together as shown in the sketch, as is usually the case in such collisions. These two steel cars weighed about 75 tons each, and the underframe end construction was sufficiently strong to resist the impact found in ordinary passenger train accidents without serious damage or loss of life.

Passenger car design may be further developed so that some greater strength in the end construction may be obtained with the present weight of steel, but little can be gained by adding weight to the section to get additional strength, as cars so constructed as to resist the impact which resulted in the collision here illustrated would be so heavy that the railways could not afford to provide the motive power for hauling present passenger

traffic in them. Besides, the expense involved in the construction alone of such heavy cars would be very nearly prohibitive.

It will be remembered that in the wreck on the Pennsylvania Railroad near Fort Wayne, Ind., a steel car was in collision with a wooden dining car, telescoping the steel car, and the position of the cars was similar to that shown in our illustration, Fig. 3. At that time there was considerable discussion as to the relative strength of wood and steel cars, and the popular impression was that a demonstration had been made of the superiority of wooden construction. It is hardly necessary to point out that in the collision referred to, as well as in the one here described on the St. Paul, the dining car underframe entered the steel car above the sleeper underframe. In each case it was simply the collision of a strong, stiff underframe with a light superstructure, and the effect of such collisions must be the same in either case.

REPORT OF THE MASSACHUSETTS RAILROAD COMMISSION.

The railway commissioners of Massachusetts, F. J. Macleod, G. W. Bishop and Clinton White, have sent to the legislature the forty-third annual report of the commission. Two new railway corporations have been organized in the state during the year, the Hampden and the Southern New England. The length of the railways in the state, at present, is 2,111 miles. Following the usual statistics a discussion of the general field of the board's duties is given, beginning with a statement, filling two or three pages, devoted to nothing but a list of things that the board, by direction of the legislature, has had to do in connection with other boards. For example, in considering the proposition for subways in the city of Boston, the board acted conjointly with the Boston Transit Commission; on the question of a proposed tunnel between the North and South stations in Boston, the board sat with the Board of Harbor & Land Commissioners, the Boston Transit Commission, and the Metropolitan Park Commission; an examination of the property of the New York, New Haven & Hartford was made by the railway commissioners, the tax commissioner and the bank commissioner, acting together; and so on. This statement is followed by notes on a dozen other propositions referred directly by the legislature to the commission. One of the subjects dealt with in this way was that of fenders and wheelguards for street cars; and a discussion of this subject takes up 40 pages of the report, the commissioners, in person or by proxy, having visited a half dozen European cities, and a score of cities in America. The Board does not recommend any further legislation on this subject. The roadbed and tracks of the electric lines and the surfaces of highways are so far from perfect that in many situations the best fender or wheelguard will do no good, while under favorable conditions the poorest device will very often produce good results.

A brief chapter is given to the subject of electrification of steam railways in the vicinity of Boston, on which the joint board, which studied the subject, disagreed. No action has been taken by the legislature. The present report holds that within the Metropolitan district electrification "is bound to come in the near future," and calls attention to the fact that one of the principal obstacles to this is the unsatisfactory condition of the relations between the Boston & Providence and the New York, New Haven & Hartford, lessee of the B. & P., the lessee being bound to make all improvements, while such improvements eventually become the property of the lessor.

The board has approved certain new securities issued by the Boston, Cape Cod & New York Canal Company, and in connection with the construction of the Cape Cod Canal, has authorized temporarily the use of a railway grade crossing, a section of the Woods Hole branch of the New Haven road having been re-located to accommodate the canal.

CHARLES A. PROUTY.

Charles Azro Prouty, as announced in our columns last week, has been elected chairman of the Interstate Commerce Commission for the ensuing year. Mr. Prouty succeeds Judson C. Clements, in accordance with the plan announced last year, following the resignation of Martin A. Knapp to become presiding judge of the new Commerce Court, that a new chairman would be elected each year in the order of the commissioners' length of service. After Mr. Clements, Mr. Prouty is the ranking member of the commission in point of seniority. He was appointed in 1896, and has served continuously ever since, always bearing a most prominent part in the numerous activities of the commission.

It has been an open secret that he had been selected for appointment as one of the judges of the Commerce Court at the time of its organization, but that he preferred to remain "on the firing line" in the performance of the more arduous and multifarious duties of the commission.

Personally, without doubt one of the best-known and most popular of the commissioners, Mr. Prouty has been generally regarded by both railway men and the representatives of the shippers as one of the very ablest of the members of that body. A man of unusual natural parts, tireless energy, keen insight into men and matters, he has acquired a remarkably comprehensive knowledge and understanding of railway and commercial affairs, and enjoys a power of logical and forceful reasoning, which, with his universally recognized unwavering honesty have commanded the highest respect for his opinions even on the part of those who may often have disagreed with his conclusions.

The same qualities have also made him a powerful factor in bringing about a better understanding between the transportation and the shipping interests, while very strongly influencing the character of the work of the commission. He has written the opinions in many of its most important and far reaching decisions, including some that have involved the most strenuous controversies. Among the more recent of these may be mentioned particularly the opinion in the eastern general rate advance case last year, most of the long series of decisions growing out of the transcontinental rate cases, and the opinion in the Southeastern rate case. The latter two cases are now before the supreme court. He has also been one of the most active and industrious of the commissioners in traveling about the country hearing important cases. During the early years of his connection with the commission he had much to do with the criminal branch of its work, and conducted many of its investigations.

Mr. Prouty is a lawyer by profession, and one of the most distinguishing characteristics of his work has been the clear and logical reasoning, as well as the remarkable literary quality, displayed throughout his opinions. His capacity for absorbing intricate details and the analytical powers which he brings into play in separating the salient facts from the non-essentials during the progress of a hearing, coupled with his wonderful memory, have often aroused the admiration of those who have observed him in action; while his shrewd, dry humor and a certain pleasing quaintness in his rugged personality have done much to relieve the strain and expedite the proceedings of a complicated case.

Members of the Interstate Commerce Commission have been selected for appointment with a view to giving representation to the different sections of the country. Mr. Prouty in this respect represents the New England and northeastern states. He is a native of Newport, Vt., where he was born October 9, 1853, and where he now maintains his permanent residence. He was graduated from Dartmouth College in 1875, and taught school for several years before he was admitted to the bar in 1882. He practiced law at Newport from 1882 until 1896, and meanwhile was a member of the lower house of the Vermont legislature in 1888, and was reporter of the supreme court of the state from 1888 to 1896. In December of the latter year he was appointed a member of the Interstate Commerce Commission, and has since been regularly reappointed on the expiration of his term.

CONVERTIBLE RAILWAY BONDS.

BY WILLIAM Z. RIPLEY,

Professor of Economics, Harvard University.

The convertible bond, so called, has come into extraordinary favor since 1901. Such a bond, as its name implies, may under a specific contract as to time and ratio be exchanged for capital stock. Securities of this character combine the double assurance of a first lien on assets at the start, and participation in growing profits, when success of the enterprise has become certain. Such bonds were common in the highly speculative period after the Civil War. The St. Paul 7's of 1873 are a good example. The most widely known convertibles, however, were those of the Erie road. Daniel Drew and "Jim" Fisk used them to good effect in their classic contests with Commodore Vanderbilt for control of that property. They were a necessary adjunct to the reckless stock market speculation of the period. The plan was simple. Having quietly secured authorization by stockholders for a large issue of convertible bonds, Drew would create the appearance of a shortage in the supply of outstanding Erie stock. Other speculators having sold short would cover at high prices, Drew supplying them by selling shares which he did not yet possess, but which were borrowed for the purpose. And then, when Vanderbilt, who was seeking control of Erie, and all other dealers who were covering their commitments at high prices based upon a calculated shortage, had become loaded up with agreements to buy, Drew would convert his bonds into stock, flood the market, break the price and close out all his contracts for delivery at large profits. The scandals of the time so eloquently described by Charles Francis Adams in his Chapters of Erie, gave a bad repute to this class of security, which lasted for many years.

Revival of interest in convertible bonds seems commonly nowadays to be associated with periods of financial distress. They are not, however, storm signals like short-time note issues, as already described. But they are apt to be resorted to in a time when an added fillip to investment in railways seems to be needed. In the same period of 1893 several strong companies made use of them. Some of these were really expedients for selling new stock at par for improvements; although the old shares were being quoted at a discount. In other words the combined security of a bond with a fixed rate of return, and of the speculative chance of added profit upon conversion when the stock rose above par, enabled the company to secure new capital at more favorable rates than it otherwise could have done.

The next period of activity in convertible bonds was associated with the great consolidations about 1901. The most notable instance was the \$100,000,000 issue of the Union Pacific in order to finance the purchase of the Southern and Northern Pacific. Other important companies like the Pennsylvania and the Baltimore & Ohio resorted to the same device in 1902. The prime motive in adding the conversion privilege at this time, seems to have been to overcome the prejudice against bonds secured, not by a direct lien upon real property but upon securities of other roads to be purchased with the proceeds. In other words many of the issues of this period of active consolidation were collateral trust bonds, elsewhere described. As such they needed some privilege, or opportunity for peculiar profit, in order to dispose of them on favorable terms.

Subsequent appearances of convertible bonds on a large scale have been principally associated with the two financial depressions of 1903 and 1907. At both times large companies like the Atchison and the New Haven have seen fit to add the conversion privilege to their new bonds, in order to make effective appeal to investors. Where weaker roads have been forced to resort to short time notes, the stronger ones have used convertible bonds. At other times as in 1905, the issues of bonds of this class by roads like the Erie, the Pennsylvania, the New Haven and the Atchison, have assumed large proportions. There can be little doubt that bonds of this sort have steadily risen in general favor in recent years.

There appear to be no less than four substantial reasons for the popularity of the conversion privilege. The most substantial one is the successful appeal which it makes to the investing public. To assured interest return, it adds a speculative chance of participating in future profits as they accrue. That was the main reason for its extended use in the early days of railway construction. And since 1900, with the active competition of industrial and mining securities with railway bonds, it has been found by experience that the addition of the right of conversion is necessary to insure a successful flotation. A second factor is found in the nature of the security behind many of these new convertible bonds. The majority of them are either debentures—that is to say, carrying no prior lien on specific assets, but rather a general obligation of the company as a going concern, or else collateral trust bonds, based upon the deposit of other securities of controlled roads. The more or less imperfect character of the security in either case, renders the conversion right necessary as an offset. In the third place, the reason which made "convertibles" simply invaluable to Daniel Drew in the '70s, is still not without significance. In several notable cases, the control of railways by particular financial interests has been menaced or lost by unexpected operations upon the stock exchange. The Louisville & Nashville in 1902 was ruthlessly torn from the Belmonts by a clever ruse incident to the issue of a large amount of new stock. The Illinois Central was likewise deprived of its long-standing independence despite a substantial concentrated minority control. And the contest for the Northern Pacific culminating on May 9, 1901, clearly demonstrated the need for ownership of a positive majority of all classes of outstanding share capital, in order to assure control. The final victory of the Morgan-Hill party over Union Pacific interests was determined by its power over retirement of the large issue of preferred stock. Yet the law does not contemplate control of competing lines by actual majority ownership with favor. A device whereby control may be practically assured, as in the Pennsylvania dominance of outlying properties, without an actual majority ownership of shares, is consequently welcome. A large issue of convertible bonds may aid in the solution of such a problem. It constitutes a reserve which may be drawn upon by the existing management in case more stock is needed in an emergency. This feature has undoubtedly in several cases led to the addition of the conversion privilege to new bond issues.

The final and most fundamental advantage of convertibility as applied to funded debt—an advantage bound to make it of continuing importance in future—is that it affords opportunity for gradually transforming fixed charges into contingent ones. Funds raised by the sale of ordinary bonds permanently saddle a heavy burden of prior liens upon earnings ahead of the capital stock. These charges must be paid whether earned or not. This was the great lesson enforced by the bankruptcies of 1894. Yet on the other hand, of course, the security is so great that capital may be obtained at low rates of return. This latter advantage would not follow an issue of new stock to finance improvements, particularly in the case of companies whose share capital stands at a premium, and whose rate of dividends is high. When the St. Paul in 1906 financed its Pacific coast extension by an issue of new 7 per cent. stock at par, it was virtually paying a higher rate for the capital needed than the new enterprise could possibly earn for some time. As a device for distributing surplus earnings of the parent company, it might be most effective. But regarded as a means of financing a new line, it was certainly expensive.

The convertible bond seems to answer the purposes of a company thus situated, more satisfactorily than either straight bonds or stocks. For it enables the new capital for the incipient and uncertain stages of the enterprise to be had on a funded-obligation basis. And thereafter, as the earning power of the extension emerges, the fixed charges become transformed into contingent ones, with the progress of conversion of bonds into stock. And this process of conversion is automatic in its action. The plan in short is that of an automatic sinking fund. As profits grow

the price of the capital stock rises, until on passing the price at which exchange may be effected, the profit in conversion leads to the freer exercise of the privilege. The ultimate outcome is a corporation freed of the incubus of a heavy funded debt, yet with net earnings demonstrably sufficient to support its capital stock. The prime instance of the successful application of such methods to a great enterprise, is the financing by the Pennsylvania Railroad of its great New York terminals in 1902 and 1905. The expedients of the New York Central in raising funds for similar purposes by means of stock and debentures seem clumsy and expensive by contrast. The great strength of the Union Pacific under the Harriman régime, viz., its low percentage of fixed charges to net earnings despite extensive borrowings for development and speculative purposes, has resulted largely from its successful use of convertible bonds as a means of raising new capital.

Certain disadvantages of convertible bonds remain to be mentioned. Common stockholders not infrequently regard them as a violation of their rights. In a sense the convertible bond holder is a share holder with a preference both as to earnings and lien on assets, whose rights are intervened between the ordinary stockholder and his property. The ordinary bond holder is not thus regarded as an intruder, his interest rate being both moderate and fixed. Strenuous protest from shareholders is not unlikely to arise, as in the case of the Atchison issue of 1905. Moreover, it sometimes happens that convertible bonds instead of being automatically eliminated by rising quotations for the stock to the conversion point, may remain outstanding as bonds for a long period and may block the way to further borrowing on favorable terms. And yet, while outstanding as bonds, they may be entitled to all the privileges of the stock. This embarrassment occurred in the Pennsylvania financing of 1909. With large amounts of unconverted bonds outstanding, further needs of the company were met by putting forth new stock, the right to subscribe to it by being confined to shareholders. This addition of new stock obviously withheld the shares from rising in price to the conversion point, and still further postponed the time at which the convertible bond holder might with profit exercise his privilege. This difficulty was met by the New Haven in a similar case of about the same date, by extending the privilege of subscription to new shares to stock and convertible bond holders alike. Unless specifically provided for by contract in advance, however, the convertible bond holder may have his privilege of exchange at a profit indefinitely postponed by such emissions of new capital stock.

Still other disadvantages obtain. The convertible bond fluctuates widely in price, often following closely the movement of the stock quotations. Large profits have been made, and likewise heavy losses, by persons who in reality sought investments stable in price. Such bonds are speculatively handled on the exchanges, being often "sold short" just like stocks. Moreover the operations incident to conversion or redemption may be complicated. Ordinary investors may not understand them. Instances are not wanting, as in the case of St. Paul bonds of 1893 convertible into preferred stock, not at maturity, but within ten days after any dividend date, where many holders failed through ignorance to take advantage of their rights at the proper time. And finally in some cases, the bond convertible into stock at a ratio below par may be open to all the disadvantages of the issue of shares at a discount. Thus in 1903, and again two years later, the Erie road issued bonds to finance the purchase of the Cincinnati, Hamilton & Dayton road (afterward abrogated) and for purposes of improvement, convertible within ten years into common stock at \$50 and \$60 per share respectively. The low market price of the stock at the time did not indicate much hope of exercise of the privilege; but if it ever occurs it will in effect violate the general prohibition by New York state of the issue of capital stock below par. A special act of the legislature rushed through in the closing days of a preceding session had amended the law by permitting conversion of bonds to take place, "at not less than the market value." The danger of a resort to

expedients for watering stock is too apparent to need further comment. In practically all other cases, the privilege of conversion is fixed at par or above, sometimes, as in the case of the Delaware & Hudson 4s, at as high a figure as 200. In conclusion, it goes almost without saying, that an increase of capital stock must always be authorized in connection with an issue of convertible bonds, sufficient in amount to cover the requisite number of new shares after the exchange of bonds for stock has been effected.

A peculiar modification of a bond, in order to give it a speculatively attractive character, occurred in the case of the Oregon Short Line Participating Bonds of 1904. These securities, to the amount of \$36,500,000 were based upon a deposit by the Union Pacific interests of their holdings of Northern Securities stock. In other words, they were not ordinary but merely collateral trust bonds; and the participating clause was added in order to overcome this disability and assure their successful flotation. In addition to a guaranteed 4 per cent., these bonds were to receive annually a supplementary interest, equal to whatever dividend in excess of 4 per cent. might be declared upon the Northern Securities stock which underlay them. A peculiar complication arose in this connection. Dividends upon Northern Securities stock being held back by litigation, threatened to pour forth in mass upon its termination, while in the meantime the regular 4 per cent. had to be paid from other sources. Were the participating bonds to share in all excess dividend above 4 per cent., when all these back dividends appeared at once, the Oregon Short Line would be a heavy loser. A provision for retirement at 102½ pointed the way of escape. It enabled the company to release the underlying collateral, upon the dissolution by decree of the Supreme Court dissolving the Northern Securities Company. This was effected in 1905.

Car trust certificates or equipment trust bonds are highly specialized liens upon particular items of railway property. A company having mortgaged all of its tangible assets, and being unable to issue new capital stock, is in dire need of new cars and engines. There are practical as well as legal objections to direct loans based upon the acquired rolling stock as collateral. A round-about plan is in use, which practically amounts to borrowing the equipment, instead of the money; and paying for it gradually as surplus revenues permit. An independent syndicate is formed, which purchases the desired rolling stock, as in 1903 on the Pennsylvania system some 13,000 freight cars. Or it may be one of the great railway equipment companies enters into the agreement. The cars are then leased to the railway for a short term of years, under an agreement providing for interest and gradual payment of principal. Only upon the final payment does actual title to the property become vested in the railway. In the meantime, it would appear to have no equity in the property. The lease thus made is then assigned to a trustee, and "car trust certificates" are issued and sold to investors. The requisite interest upon these bonds of course are derived from the rentals paid to the trustee by the railway company under the terms of the agreement. This cumbersome process seems to be an outgrowth of the inelastic character of the mortgage bonds of the railway already outstanding. The deed of trust itself is a highly complicated instrument, providing for repairs, maintenance and replacement of the property, and its final delivery at maturity. Bitter experience of former years, as upon the Erie in the '70s where car trust certificates at maturity found the rolling stock completely worn out, have compelled the most elaborate safeguards against fraud. Recently the process seems to have been simplified somewhat by the abandonment of the terminology of a lease contract. Despite the complexity of such operations, the volume of equipment trust obligations has enormously expanded in recent years. While the total funded debt of American railroads between 1898 and 1907 increased by about 60 per cent., equipment trust obligations increased over eight fold. The total outstanding in 1908 was \$344,000,000. While not a large proportion of the total funded indebtedness, the rate of increase in recent years has been notable.

LIGNITE FUEL FOR LOCOMOTIVES.

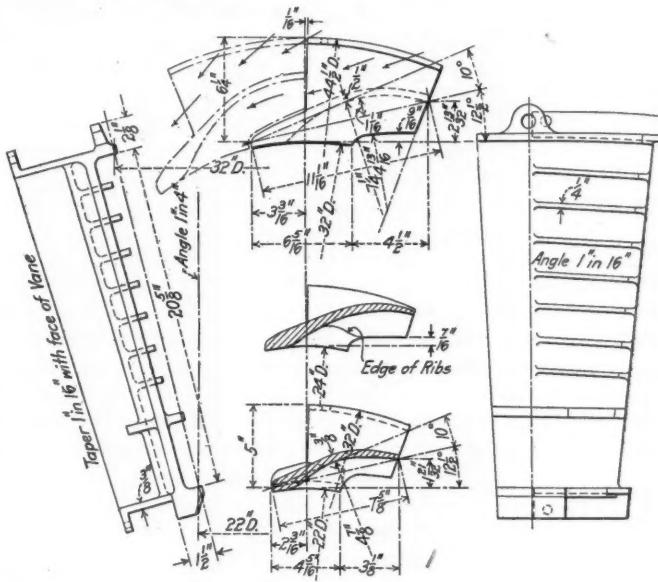
The cost of Iowa coal for locomotives on the Chicago & Northwestern in western Nebraska and Wyoming is \$5.20 per ton. The Northwestern has been gradually developing the use of lignite in the district west of Long Pine, Neb., the lignite coal fields being in the neighborhood of Lander, Wyoming. The cost of lignite in that region is about \$2 per ton, and it has an analysis about as follows:

Fixed carbon	37.72
Volatile combustible	38.66
Ash	2.21
Moisture	21.41
	100.00
Sulphur	4.24

The railway now has 21 Pacific locomotives in that region which are equipped with special spark arresters for use when burning lignite coal. These engines have cylinders 20 in. by 26 in., a grate area of 46.55 sq. ft., driver 63 in. in diameter, and the total heating surface is 2119.7 sq. ft. The smokebox is 70 in. in diameter and 86 in. long, which permits a large area of baffle plates and netting; but the principal features of the locomotive which enables it to burn lignite successfully are the gyrus spark arrester and the annular exhaust nozzle. These were developed by the American Locomotive Company in co-operation with the Chicago & Northwestern, and are here illustrated in detail.

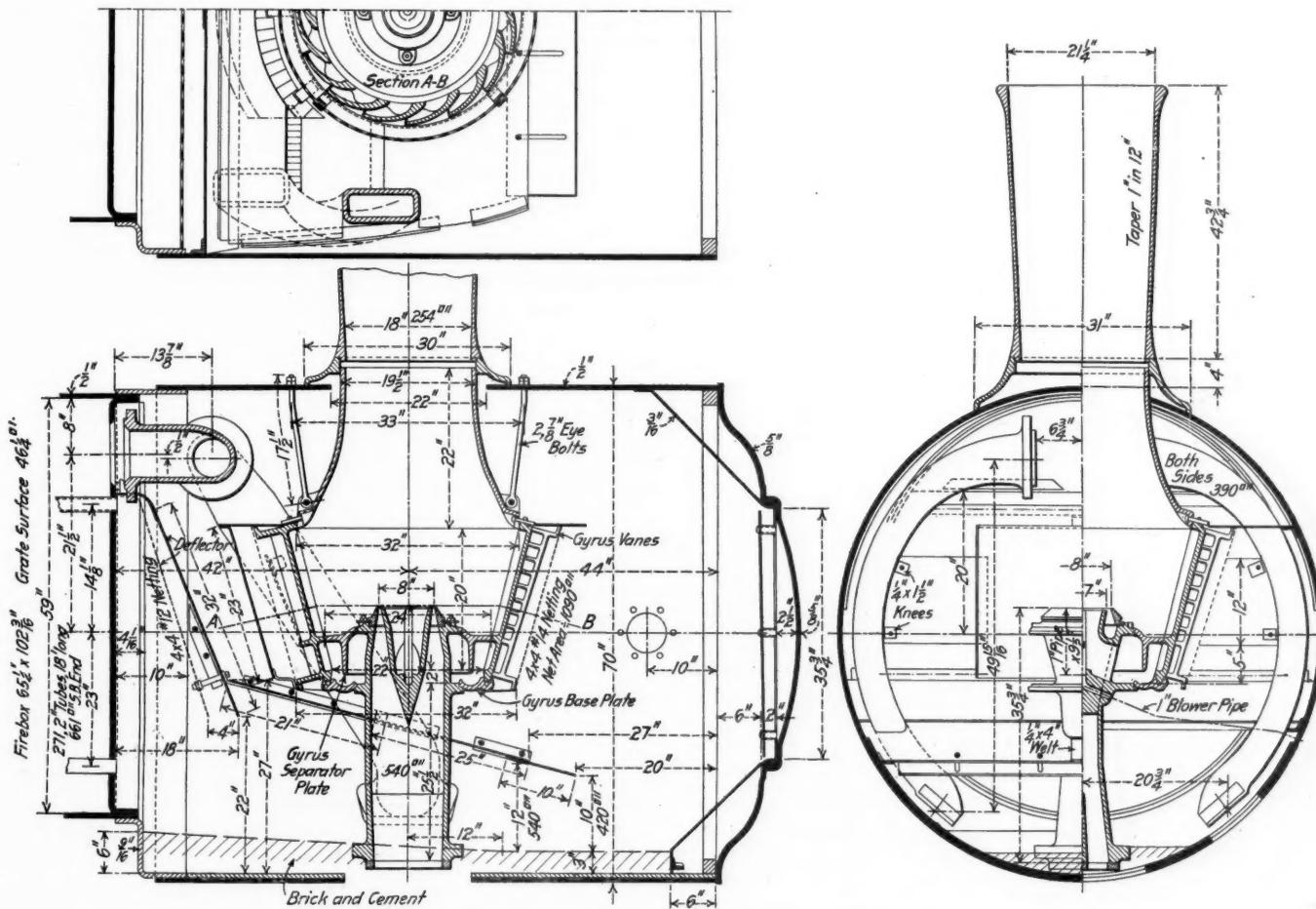
The annulus of the exhaust nozzle has an outside diameter of 8 in. and an inside diameter of 7 in., and there is a side opening in the partition wall of the exhaust base which causes a uniform distribution of the gases and sparks through the gyrus. The gyrus is a large cast iron barrel surrounding the exhaust nozzle, shaped like a truncated cone with the small end down. The diameter of the flanges is 32 in. at top, 22 in. at the bottom. This barrel is built up of 16 vanes, 20 $\frac{1}{8}$ in. long under the flanges, and these vanes have on their outer surface seven curved ribs, which act

as deflectors and retard the escape of the sparks. The floor of the smokebox is covered with firebrick 3 in. to 6 in. thick and there is a 3/16 in. sheet iron jacket to protect the front end. The usual baffle plate in front of the tubes is covered with No. 12 netting, which gives the sparks an initial abrasion and throws



Details of the Gyrus Spark Arrester.

them toward the brick floor. A flat deflector plate laid 10 in. from the floor at the front end and 27 in. at the rear end, tends to keep the sparks down until the exhaust draws them forward and into the gyrus, where they finally make their escape to the stack in a fine state.



Gyrus Spark Arrester Applied to Locomotive Smoke Box.

CONFERENCE COMMITTEE METHODS IN HANDLING
RAILWAY LEGISLATION ON MECHANICAL MATTERS.*

BY C. A. SELEY,

Mechanical Engineer, Rock Island Lines.

The regulation of the railways by means of administrative bodies divides itself naturally into two general classes. The one has to do with that feature of the regulation in which is involved a conformity with the law as interpreted by the courts, and the other with the administration of the physical and as distinguished from the legal. The first of these has to do mainly with the prevention of discriminations and other abuses, while the second touches the railways in the matters of every-day life, and the influence extends down into every portion of the service. As the speaker is not a lawyer, it is not his purpose to cover more than one phase of the subject wherein the engineer has been useful in shaping the details of legislation.

The laws which regulate the various functions of the railways are administered mainly under the control and direction of the Interstate Commerce Commission. Many of these require elaborate codes of rules and explanations for their proper understanding and administration, and the inquiry naturally arises as to how these rules and instructions which have to do with technical details were originally derived. Surely it would be difficult to find a department of the government dealing with more diverse subjects and on which there must be a multitude of questions arising from the various subjects covered by the regulation which the commission is empowered to direct. One might expect to find a very competent staff of legal, accounting and engineering talent in connection with such a department of the government, and there may be, but the mechanical engineer is not strongly in evidence.

It is self-evident that without the expenditure of great sums of money and a great deal of time the government cannot obtain the services of a body of experts which can compare in ability with those already in the service of the railways; and, second, that even if they could obtain such a body of experts, to bring these men to the point which has been reached by the railways' through so many years, would take another long period. As a result, it becomes peculiarly an act of good citizenship on the part of the railways to place their expert knowledge at the service of the government.

Some two years ago the idea was advanced that inasmuch as it was clearly evident that public policy required the enacting of laws and regulations further controlling the activities of the railways it might be well if the men engaged in the practical operation of the roads would interest themselves in the form which the statutes proposed to be enacted should take, not with a view to necessarily making them less comprehensive, but with the idea that the intrusion of practical thought in their formation might result in their being workable to a certain degree. At that time this was considered a very radical view; nor was it completely formulated in the first instance. This policy developed a further field of co-operation, in the fact that under most of the legislation covering physical regulation there was involved the formulation of rules and standards for the government of the carriers, and in these formulations the experience of practical men would be just as valuable, and in fact more so, than in the consideration of the primary law itself upon which the regulations were based.

Acting on this theory, during the Sixty-first Congress it was the policy of the roads whenever any bill was under consideration relating to railway operation to present before congressional committees, men who from their knowledge and experience could tell such committees exactly what the proposed legislation meant and what the effects thereof would be. There is no question as to the necessity for this procedure. As an illustration, it is a matter of record that it was necessary for one of these witnesses to explain to a committee that the water in a locomotive

boiler was not contained in the tubes; and to this co-operation between congressional committees and witnesses for the railways may be attributed the fact that such legislation affecting the physical operation of railways, as passed the Sixty-first Congress, was intelligent and of a character that it was possible to enforce without testing the matter in the courts. Under some of these statutes it was necessary to formulate certain standards and rules, notably the standards of United States safety appliances, and the rules for locomotive boiler inspection. The first of these was under consideration before any of the others. There was serious danger that the United States safety appliance standards would be formulated without due consideration as to practicability and difficulty of enforcement, and for some time there was very serious question as to whether any co-operation or assistance from the railways would be accepted on the part of those responsible for the formulation of such standards. However, after this principle was established the proceedings were rapidly conducted, and the benefits of such an arrangement were so manifest that in every case which has occurred since that time not only has this co-operation been welcomed, but in many cases has been sought by the representatives of the departments of the government charged with the enforcement of the laws.

United States safety appliances have been referred to; these are the ladders, handholds, sill stops, running boards, etc., on railway cars and locomotives. The Master Car Builders' Association, a representative body, had for years illustrated and described consistent arrangements of these appliances in its proceedings as standards, and, if all railways had fully complied with the requirements of these standards on their rolling stock it is not likely that the recent legislation on that subject would have been enacted. It is a fact that the standards of the M. C. B. Association are not obligatory on the railways, but its practice in respect to the safety appliances was satisfactory to the Interstate Commerce Commission for many years as complying with the law. The labor organizations engaged in railway transportation developed a feeling that this was not sufficient and succeeded in persuading congress to pass an act directing the Interstate Commerce Commission to prescribe the number, dimensions, location and manner of application of these various appliances, so that they would be uniform as nearly as possible on all cars.

The standards were to apply on all cars built after July 1, 1911, and the commission was authorized to name the time limits in which equipment built before that date should be changed to comply. The latter equipment, including about two and one-half millions of freight cars, was by far the most important feature, as it would be comparatively easy to change drawings and specifications for new equipment not yet built. To go over every old car and make the necessary changes to comply with a set of rather rigid requirements involved enormous expense, both direct and indirect. The secretary of the Interstate Commerce Commission asked for a committee from the railways to assist in compiling the proposed standards for new cars, and when this work was done the Interstate Commerce Commission had a hearing at which these proposed standards were submitted in the usual form with opportunity for argument.

The railways present by their representatives at once took the ground that the matter was not in shape for a hearing and final determination; that while they could comply with the requirements on new cars, that the rigidity of the standards should be modified, variations allowed, and that liberal time should be granted for changing the older cars. Some little time was taken in discussing the details, but it all proved that the position of the railways was correct and the hearing was adjourned to permit of a conference committee handling of the matter. This committee consisted of fifteen members, five railway mechanical men, five Interstate Commerce Commission inspectors and five labor organization chiefs, representing the locomotive engineers, firemen, conductors, trainmen and switchmen. The conference lasted several days with much argument and mutual concession and set-

*Part of an address delivered before the engineering students of the University of Illinois, January 4, 1912.

tled the matter entirely save two or three points on which no agreement could be reached. These and the agreed points, together with the respective arguments, were submitted to the Interstate Commerce Commission in a second hearing, and an order was issued under which the railways are now working.

The labor organizations were also not satisfied with the inspections of locomotive boilers, as made by the railways; at least they apparently could not understand why the engine crews were generally blamed in case of boiler explosions, and they determined to have a federal boiler inspection law. Several bills were introduced in Congress, but by intelligent presentation of information and records of the roads' methods of inspection and tests at the committee hearings the more radical and unreasonable bills were successfully opposed. It was, however, recognized by the railways that they could not consistently oppose reasonable regulation in the matter, and conferences were held with those interested to determine the essentials of a reasonable boiler inspection law. The Master Mechanics' Association had reported a set of minimum rules applying generally to all locomotives based on general practice. These were considered together with methods of administration, force and the scope of their duties, etc., and the present law was framed to include these considerations and was not opposed by the railways.

The law provided that the Interstate Commerce Commission should formulate and issue the rules under which the railways should inspect, test and report their boilers. The five railway mechanical men who had conducted the safety appliance negotiations met with the boiler inspectors of the commission and the labor organization representatives and agreed to the code of rules which by order of the commission now regulates our boiler inspection.

I will not weary you with the detail of all the routine necessary in those negotiations; of the calling of a general meeting of the railways to settle preliminaries, of the authorizing of the conference committee to represent all the roads, of the reporting to the general meeting for approval of the results reached in conference before they are submitted to the commission, and the final discharge of the conference committee, so far as that subject is concerned after the commission's order has been issued.

Recently the post office department asked for a conference with the roads in regard to formulating specifications for the construction of steel full postal cars and for the uniform arrangement of the equipment of both full postal and apartment cars. The matter was taken up by a general meeting of the roads who again authorized the conference committee of mechanical officers, reinforced by a couple of mail traffic managers, to represent them, which they did, first ascertaining the scope and extent of the general features desired to be covered. The committee, assisted by the engineers of the car building companies, who cheerfully gave of their experience and knowledge, then formulated a specification for steel full postal cars. After the specification was completed and unanimously concurred in by all members of the committee and by the assisting engineers of the car builders, it was referred to and approved by a general meeting of the railways. It was then submitted to the committee of the post office department and thoroughly discussed in an extended conference. It will doubtless take some little time to entirely settle the matter, as the specification is very complete and voluminous. The post office department committee found it rather difficult to understand and assimilate the engineering portions of the specification relating more particularly to the strength of the structure, as section moduli was a term not ordinarily used in post office transactions. They were surprised that we could not give them direct comparisons of the strength of wooden and steel cars and had hoped that we could help them to arrive at a single standard of design. The specification was printed in the November 24 issue of the *Railway Age Gazette*, pages 1049 to 1051, and there were editorial references in the issues of November 17 and December 1.

The work of the committee had to include several important considerations. First, the post office department had accepted

several designs of steel postal cars, none of which had been demonstrated as a failure. Hence, it was obvious that the specification should be broad enough to include all of the designs.

Second, the specification, in order to be authoritative, should have the approval of all the designers of the various types included, and also of the users of the cars who by experience in handling and maintaining them could judge of their suitability to the service and the general results of the designs in normal operation as well as in repairs and wrecks. We were fortunate in having the unanimous approval of all the engineers and of the railways back of our specification.

Third, due regard must be paid to the evolution of steel car construction in the future, and the form of the specification should not be such as to bar progress in design and improvement in materials.

Fourth, Congress may pass one of the several steel passenger car bills that have been introduced, and doubtless the postal car specification would be studied as to its application to other types of steel passenger equipment cars.

It is admitted that as the postal car is generally placed next to the engine it is in a place of greater hazard than are other cars in the train in the case of a head-end collision, and we agreed to furnish a greater measure of strength in the end framing to minimize the danger of telescoping. Aside from this, however, we do not feel that the structure of a postal car should necessarily be stronger than that of other types of cars and the best results can be obtained by having consistent strength throughout the train.

The public has gained some very erroneous opinions about the strength of steel cars. If they were in fact so strong as to resist deformation in a severe wreck it must be apparent that they would pass the shock along to the contents of the cars, human and otherwise, in dissipating the stored energy. It has been amply demonstrated by experience in several wrecks that the amount of damage and injury is greatly lessened by providing a yielding resistance in the end of the car, such as the folding up of the vestibule or platform or partial failure of the end construction. If these parts are so strong as to resist failure, the shock will be transmitted until it is dissipated at a greater risk to life and the contents of the cars.

The principal advantages of steel passenger car construction are the absence of splintering and less danger of fire from external causes in case of wreck. Danger has been feared when both wooden and steel cars are used together in trains, but a wooden sleeper has been known to telescope a steel sleeper, and a prominent lumber association has spread broadcast photographs showing how well a wooden dining car in an otherwise steel train had withstood injury in a severe wreck. The truth is that wreck conditions are seldom so similar as to permit direct comparison, and, while the wooden cars are the result of an evolution covering several decades, the steel car is of very recent origin, and, that we can reasonably expect improvements in design, reduction in weight, and cost as has been the case in development generally of equipment, machinery and other structures.

The postal car specification provides that the underframe is to be calculated on an assumed end shock equivalent to 400,000 lbs. static load, which will take care of very heavy switching and service conditions, but not of extreme collision shocks, which should be dissipated by end failure. Thus it will be seen that the duties of the conference committee have been so varied as to require a considerable range of practical information as well as technical and engineering knowledge. The handling of these questions in the conferences required skill in debate and argument suited to the caliber and character of the people with whom issue is raised.

As the conference committee represented all of the railways, the members must of necessity take the broad view and not just that of their own little or big road, as the case might be. The personnel of the committee included the highest officers in the mechanical departments of such railway systems as would

practically represent all sections of the country, and while the time necessarily devoted to these protracted conferences was a heavy tax, both on the individual and to his company, yet the results obtained have been so satisfactory as to justify the expenditure of time and the methods employed.

It cannot be too strongly emphasized that the amount of work committed to the various governmental agencies through legislation is vastly in excess of the capacity of the present organization of such agencies to perform satisfactorily. The administration of such vast interests, which should be committed to men of first rate ability in some cases, and in others to men of thorough technical equipment, is left to the tender mercies of men who, however well meaning, have not the equipment necessary for the effective administration of their offices, nor under the conditions with regard to compensation which now exist can these agencies hope to secure men of the type desired. Under these circumstances, the cordial co-operation of the railway administrations is practically essential to prevent utter demoralization in the transportation industry.

That this co-operation has been willingly afforded is clear evidence of the desire of the railway corporation to contribute to the success of the governmental agencies upon their administrative side, and in this respect the railways, which have been a mark for every petty politician for so many years, have demonstrated the appreciation on the part of their officers of their duties as "citizens of no small country."

NEW YORK PUBLIC SERVICE COMMISSION'S ANNUAL REPORT.

The Public Service Commissioners of the state of New York, Second district, F. W. Stevens, M. S. Decker, J. E. Sague, J. B. Olmsted and W. A. Huppuch, have completed the fifth annual report of that commission, and have issued a brief abstract from which we take the following data:

During the year the commission has had presented to it 2,321 propositions, the work having steadily increased during the four years of the commission's existence. The number of formal complaints disposed of during the past year was 314, and 1,593 were conducted by correspondence; 572 public hearings were given, occupying 285 days, nearly 100 days more than in the preceding year.

The railways reporting to the commission had an increase of 3.2 per cent. in their gross receipts, but a decrease of 7 per cent. in net as compared with the preceding year, though the net receipts were 6 per cent. better than in 1909. The electric railways reporting to the commission had total receipts of 27 millions and net over 10 millions, which last is 50 per cent. greater than in 1907. The business of the electric railways grows steadily. During the past year they carried 542,695,000 passengers; increase in receipts 8 per cent.; in operating expenses 4 per cent.; and in net receipts 15.1 per cent.

Careful inspection of steam railways has been continued, and there has been a decided permanent improvement in roadway, equipment and structures. The commission has given considerable attention to the matter of rail breakages, and it is found that the total number of breakages for the year ended June 30, 1911, was 3,228, as against 3,670 for the year ended June 30, 1910. As there are probably somewhat more than four million rails in the main tracks of the railways of the state, the figures this year correspond to a yearly breakage of about one rail in 1,250, or one break per year in each 3.8 miles of track.

Referring to the serious accidents happening on the Lehigh Valley at Burdette and Manchester, and on the Buffalo & Susquehanna at Scio, it is noted that the rails involved were rolled by so-called independent steel companies. No conclusion can be drawn, however, from this fact, as the records of the commission indicate a rate of breakage higher than the average in some particular orders made by a number of mills in the country, including some of those owned by the United States Steel Cor-

poration. The commission has in mind cases where roads have on their own initiative removed rails amounting to thousands of tons, where excessive breakage was shown by their records, rather than run the risk of accidents.

In relation to the Lehigh Valley accident at Manchester, the commission says that a careful study fails to show any failure whatever on the part of the railway company to provide reasonable and proper safeguards, including first-class track and an automatic signaling system, with electric track circuit, and rails of ample strength, for which an extra price had been paid, with a view to securing superior quality.

Attention is called to the fact that a large proportion of rail breakage on lines using electric track circuits has been detected by interruption of the circuits and the consequent setting of signals at "stop," and there appears to be no doubt that a considerable number of accidents have thus been prevented.

Rear collisions continue to be too frequent and the inspectors are trying to secure improvements in signaling and in discipline. The inspectors of cars and engines report that on most of the roads the boilers, machinery and safety appliances are in much better condition than in former years. There is a general tendency to improve the repair terminals and facilities, to raise the standard of inspection and to increase the efficiency of locomotives. The New York Central has labored under great difficulties by reason of a strike of employees in its boiler shops. Some of the smaller roads have inadequate repair facilities and some even have no officer who is sufficiently posted as to the importance of maintaining safety appliances in good condition. The commission has under its supervision for inspection 8,616 locomotive boilers. A year ago 208 boilers were below the standard of safety, but this number has now been reduced to 15. In the State Forest Preserve the commission has required the use of oil-burning locomotives and there has been only one railway fire of importance during the year.

Twenty-nine crossings of steam railways have been abolished during the year and work is in progress on seven others. Since 1897 the State has appropriated for this work \$2,317,607 and 272 crossings have been eliminated. There still remain about 8,500 grade crossings of steam railways, and the commission asks for \$550,000 from the State treasury for grade crossing work this year.

The electric railways supervised by the commission aggregate 2,722 miles in length. The interurban roads have killed no person in a collision this year, a result due to the efficiency of motormen, conductors and operating officers. The commission has required the improvement of methods of operation. Five persons have been killed at grade crossings of electric roads; and the improvements in highways and the increase in the number of automobiles indicate that this death record will grow larger rather than smaller. A majority of these accidents are believed to be due to the recklessness of automobile drivers. The commission has made thorough investigation of street railway conditions in Syracuse, Albany and Ithaca, resulting in important improvements.

A large part of the report is devoted to gas and electric lighting. Gas meters, which were inspected to the number of 87,893, show improvements during the past three years, though even now only 80 per cent. are found correct; about 6 per cent. were found fast.

This commission has jurisdiction over telephones throughout the State, including both the first and the second districts. During the year 424 central offices have been inspected and "a vast number" of defects in operating efficiency have been found.

One of the victims of the Chinese insurrection was Tuan-fang, the general manager of the Canton-Hankow Railway. He had been governor of a province, and while in charge of the construction of this railway was put in command of troops which marched against the insurgents.

**DAILY STATEMENT OF TRANSPORTATION EXPENSES
ON THE MILWAUKEE.**

The Chicago, Milwaukee & St. Paul, in addition to the fuel report which has been used for a number of years, has adopted a form for making daily statements of transportation expenses, primarily for the use of division and terminal superintendents. The reports are made up in the office of each superintendent, and copies are supplied to the offices of the assistant general superintendents.

The fuel report is made in each train despatcher's office from the train sheet and coaling station records. This shows for eastbound, westbound and total business the train mileage, ton mileage, average tons per train, pounds of coal consumed and average pounds of coal per 100 ton miles. These reports are made daily, and are combined in the office of the fuel inspector into weekly and monthly fuel reports, which are serving well to compare economies in fuel consumption over the entire system. The figures are compared with the corresponding figures for the same week or month of the previous year.

The clerk in the superintendent's office who has charge of the daily statement of transportation expenses has access to this fuel report, from which he takes the train mileage, ton

Chicago, Milwaukee & St. Paul Railway Co.					
DAILY STATEMENT OF TRANSPORTATION EXPENSES.					
Division.		191			
REVENUE FREIGHT TRAIN STATISTICS—MAIN LINE					
Train Miles	Ton Miles	Average Tons per Train			
		DAILY TOTAL	COST PER 1,000 TON MILES	ACCUMULATED TOTAL	COST PER 1,000 TON MILES
Proportion of Superintendent's Office Force.					
Train Masters, Train Dispatchers and their Office Forces					
Station Agents, Telegraphers and Telephone Operators					
* * * * * Overtime					
Signal and Interlocking Operators					
Other Station Employees					
Yardmasters and Clerks					
Switchmen and Switch Tenders					
* * * * * Overtime					
Yard Engineers					
* * * * * Overtime					
Freight Trainmen, Road Time					
* * * * * Overtime					
* * * * * Terminal Delay					
Freight Engineers, Road Time					
* * * * * Overtime					
* * * * * Terminal Delay					
Cost of Coal for Freight Train Engines					
* * * * * Yard Engines					
Coal Houses Forces					
Crossing Watchmen					
Pumpers, Switch Light Tenders					
TOTAL					
Average Expenses per 1,000 ton miles					
Cents Cents					
PASSENGER TRAIN MILEAGE—MAIN LINE					
Wages of Trainmen					
* * * * * Enginemen					
Cost of Coal for Passenger Engines					
TOTAL					
BRANCH LINE TRAIN MILEAGE—PASSENGER, FREIGHT OR MIXED.					
Wages of Trainmen					
* * * * * Overtime					
* * * * * Enginemen					
* * * * * Overtime					
Cost of Coal for Branch Lines					
TOTAL					
WORK TRAIN SERVICE—TOTAL HOURS.					
Wages of Trainmen					
* * * * * Overtime					
* * * * * Enginemen					
* * * * * Overtime					
Cost of Coal for Work Trains					
TOTAL					
NOTES:					

Form for Reporting Operating Costs per Ton Mile.

mileage and average tons per train to be entered on the blank under main line revenue freight train statistics. The statement of cost includes every item of expense carried on station, yard and train pay rolls, together with wages of enginemen, cost of coal and a proportion of expense of the superintendent's office and such items from track rolls as pertain directly to transportation: viz., wages of coalheavers, pumpers, crossing watchmen, etc. One-half the wages of the force in the superintendent's office is charged to this trans-

portation account. The items covering enginemen's and trainmen's wages are secured from the train sheets by figuring the exact time that each train is on the road, taking into account the difference in rates for through and way freights, different classes of engines, and overtime and terminal delays. The amount chargeable to overtime and terminal delay is shown separately from road time. The daily cost is reduced to a per 1,000 ton mile unit. This unit is not the actual cost of performing the service, since it does not con-

Chicago, Milwaukee & St. Paul Railway Co.					
DAILY STATEMENT OF TRANSPORTATION EXPENSES.					
Terminals 191					
TOTAL NUMBER OF CARS HANDLED IN YARDS.					
SWITCHING SERVICE					
Proportion of Superintendent's Office Force					
Yardmasters and Clerks					
Switch Tenders					
Switchmen, Transfer Crews					
* * * * * Overtime					
Yard Engineers					
* * * * * Overtime					
Cost of Coal for Yard Engines					
Signal and Interlocking Operators					
Coal Houses Forces					
Crossing Watchmen					
Pumpers, Switch Light Tenders, etc.					
TOTAL					
Average Expense per car					
Cents Cents					
TOTAL TONS OF FREIGHT HANDLED, CAR LOADS,					
* * * * * LESS CAR LOADS,					
STATION SERVICE					
Proportion Superintendent's Office Force					
* * * * * Station Office Forces					
* * * * * Freight House Forces					
* * * * * Outside Forces					
Grain Elevators					
TOTAL					
Average Expense per ton for handling freight					
Cents Cents					
Total Tons all Freight handled, Tons.					
Total Expense all Freight handled, \$					
Average Expense per ton, all Freight, Cents					
NOTES:					

Form for Reporting Yard and Station Costs.

tain any charge for maintenance of equipment, roadbed and structures. The items making up this unit are the ones directly under the jurisdiction of the superintendent, so that it serves to show accurately fluctuations from day to day, as influenced by increases or decreases in the tonnage handled, and the adjustment of forces and movement of trains.

The costs for freight service are kept in four columns—the daily total, a daily cost per 1,000 ton miles, an accumulated total and a cost per 1,000 ton miles for the entire month up to and including that day. The accumulated total is carried forward from day to day throughout the month.

The statements of cost of passenger train, branch line and work train service include only the wages of trainmen and enginemen and the cost of coal consumed. The passenger and branch line train service costs are reduced to train mileage units, and work train costs to an hourly basis.

The daily statement of terminal expenses is divided into two sections, one covering cost of switching service and the other cost of station service. The statement of switching service is computed on the basis of the total number of cars handled, counting total number of cars in and total number of cars out. It includes all items of expense which enter into this cost except maintenance, as explained above in connection with revenue freight service. Daily and accumulated totals and costs per car are carried on the blank. The station service costs are divided into carload and less-than-carload costs. Expenses for station office forces are pro-rated between the two classes of business, the proportion for carloads being from 10 to 20 per cent. of the whole office ex-

penses. The expenses for freight house and outside forces can ordinarily be distributed directly to the account of less-than-carload and carload business, respectively. The cost of station service is reduced to a per ton unit.

These forms have been in use on the Milwaukee for about one year, and the management is well satisfied with the results which are being secured. When the system was first installed it was found that superintendents were apt to compare costs on different divisions with the idea of keeping their figures below those for other divisions on the road. This tendency has been discouraged, as it is recognized that because of the widely different conditions existing on the different divisions the unit costs could not be expected to be the same. The desire on the part of the superintendents to economize is encouraged as much as possible, and it is thought that the data furnished by these blanks is a very material aid to them in recognizing what efforts to economize are proving successful. To illustrate: too much tonnage may be given the trains, causing them to incur a lot of overtime, thus raising the unit cost. Trains may be delayed for want of an open telegraph office; an operator is put on, increasing the station rolls, but reducing the overtime of trains, and, likewise, the unit cost. Terminal delay may be excessive because of insufficient yard force, and by making a trial with additional yard engines or supervision the result should be reflected in the unit cost.

THE MIMEOGRAPH FOR RAILWAY PRINTING.

A number of railways are finding an important economy, both in time and money in the use of the mimeograph for printing tariffs, division sheets, tracers, circulars, instructions and many other forms, of which a number of copies are desired, but hardly enough to justify the expense of a printer's bill. Not only in the freight and tariff departments, but in the mechanical, engineering and other departments also, these machines are becoming more and more useful in preparing copies of forms of various kinds which would require tedious and expensive work on the typewriter to secure the required number, but which would be still more expensive if sent to a printing office. Thousands of tariffs, supplement sheets, etc., are being issued daily by the railways which require but one or two sheets, and of which but a few hundred copies or less are needed. To have this work done by printing press costs large sums in the aggregate, and the amount of this kind of work has been steadily increasing in recent years.

On the mimeograph, tariffs and similar matter may be readily prepared without going outside of the office and in a short time, merely requiring the cutting of a stencil by copying the matter on a typewriter, inserting the stencil on the machine and having as many copies as are desired run off by an office boy operating the machine.

Many railways have been deterred from adopting this economical process by the fact that the Interstate Commerce Commission in several instances has rejected mimeographed tariffs. The tariff department of a railway which has made an extensive use of the mimeograph, and found that it has resulted in marked economy and efficiency, took the question up with the commission and was advised that the only objection was to carelessly done, illegible work on poor paper which had been submitted for filing. To this the commission had registered a decided objection, but no prohibition was made against the use of the mimeograph or any other printing process provided the tariffs complied with the requirements of legibility and satisfactory quality of paper. This railway made an exhaustive comparison of the cost of printing tariffs by mimeograph and found it to be approximately 20 per cent. less than the cost of obtaining excellent work by the printing press. The actual expense of printing 500 ten-sheet tariffs with cover by mimeograph was found to be \$10.99, or 2½ cents per tariff complete, including the time of the type-

writer operator in making the stencils and of two boys employed in operating the mimeograph and in binding the copies. Over three-fourths of the issues of this road for one month were found to be of less than 200 copies each.

IMPERIAL TAIWAN RAILWAYS.*

The removal of the capital of the island of Formosa from Tainanfu, on the coast, to Taipeh, gave Governor Liu Ming Chuan an excuse to construct a railway between the capital and the coast in spite of the opposition in Peking. In 1889 a twelve-mile line connecting Tuatutia and Saitingka was opened to traffic. The work was continued until 1893, at which time 62 miles were opened to traffic between Hsinchu and the northern port of Keelung. At this period the Peking government issued an order to suspend further construction work. All the collieries were closed, and, with the exception of passenger traffic there was little activity in transportation.

When the Japanese assumed control of Formosa in 1895 they found the 62 miles of railway in operation. This line represented a cost to the Chinese of approximately \$1,360,758, but, owing to the opposition of the Peking government, it had not been properly maintained. The Japanese decided to reconstruct the road throughout and a special survey was made for the extension of the existing line. In 1899 the government of Formosa planned the construction of a trans-insular line. The estimated expenditure of the new line was \$14,400,000, to be spread over a period of ten years. This sum was included in the general development budget and the funds raised formed part of the Japanese government Taiwan public works loan, which was issued for the purpose of carrying out various works and the construction of railways. The cost of construction was lower than the estimate, owing to the fall of wages and a modification of the original route.

The main line and branches comprise 18 tunnels, aggregating over four miles; 28 bridges of over 300 ft. long, totaling over six miles. Much of the route lay in mountainous country, presenting many difficult engineering problems. The estimate of \$14,400,000 was reduced by \$625,000. This makes an average cost of about \$50,000 per mile for the 271 miles of narrow gage line. Such satisfactory progress was made in the construction of the main trunk line between Shinchiku and Taokow that about 247 miles were completed by April, 1908, together with a branch line from Daitoku to Tamsui, 14 miles, and another connecting Taokan with Kukiyodo, 11 miles, a total of 272 miles. On October 24, 1908, the line was officially opened to traffic. The results for the first year of operation were most satisfactory to the Japanese government which guaranteed \$12,901,686 of the bonds.

The report showed that the general condition of the road was satisfactory and that there was a balance of \$653,695 for just a little over one year's operation. The rolling stock consisted of 54 engines, of which 8 were made in America; 112 passenger cars and 826 freight cars, and was valued at \$1,319,670. The passenger revenue was \$615,119; the freight revenue, \$755,867; miscellaneous receipts, \$4,424; total revenue, \$1,375,410. Expenditures were \$721,715. The number of passengers carried during the year was 2,691,034, and the freight tonnage was 711,930 tons. There were 2,756 persons employed on the line and the salaries and wages amounted to \$281,840.

Plans have been adopted for the extension of the system by two branch lines in the eastern and southern parts of the island. The Taito line, about 60 miles long, will run along the southeast coast connecting Taito with Karenko, both of which are important towns having populations of 4,000 and 2,500 respectively. The cost of this line is estimated to be \$2,119,986. The work was started in January, 1910. The other branch line will be about 41 miles long and will start at Kagi, where a bamboo pulp factory is located. This line will tap the camphor trees district at Mount Ari. The estimated expenditure of this line is \$1,326,672. The gage of both these branch lines will be 3.06 ft.

*Abstracted from an article in *The Far Eastern Review*.

Maintenance of Way Section.

WE wish to call the attention of our readers to the contest on track kinks which closes January 25, and to urge that contributions be sent in promptly. A description of any novel method or device applicable to track work by which a saving in time, labor or material can be effected is eligible to this contest. In view of the large number of such kinks developed in track work in different parts of the country the contributions should be numerous and valuable in character. Those descriptive of the handling of winter track work, either in terminals or out on the line, will be especially helpful. Prizes of \$25 and \$15 will be awarded the best two contributions, and we will pay our regular space rates, with a minimum rate of \$3, for all others accepted for publication. Contributors are urged to send in collections of kinks, each of which will be paid for if accepted. All contributions must be in the hands of the Civil Engineering Editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, not later than January 25.

SIX papers were submitted in the contest on Improvements in Maintenance Work During 1911, which closed December 25, 1911. The judges, L. R. Clausen, division superintendent Chicago, Milwaukee & St. Paul; E. D. Swift, engineer maintenance of way Chicago & Western Indiana, and F. M. Patterson, assistant engineer Chicago, Burlington & Quincy, awarded the first prize to P. H. Hamilton of the St. Louis & San Francisco, Pittsburg, Kan., and second prize to M. Ganley, roadmaster Atchison, Topeka & Santa Fe, Argentine, Kan. Other papers submitted by R. C. White, division engineer Missouri Pacific, Little Rock, Ark.; E. R. Lewis, division engineer Michigan Central, Bay City, Mich.; J. D. Archibald, assistant supervisor Northern Central, Baltimore, Md., and F. L. Burrell, general foreman bridges and buildings Chicago & North Western, Fremont, Neb., have been accepted and will be published in this and succeeding issues. Probably in no recent year has more attention been paid to this phase of railway work than in the past year. The papers submitted describe simple methods which can be put into use on almost any division with good results.

ALTHOUGH the Wood Preservers' Association is but eight years old, it is one of the strong organizations in the maintenance of way field. It is growing rapidly in strength, having during the past year nearly doubled its membership. It has made for itself a reputation as an authority on timber-treating, and its proceedings are in demand. The convention of this week was the best which has been held, and the papers presented are an evidence of the interest taken by the members, both in their individual work and that of the association. Although the timber-treating industry is not confined to the railway field, it receives its main application there and the importance to which it has grown illustrates the wide and constantly increasing diversity of the work under the supervision of the chief engineer of the modern railway. It is not many years since the chief engineer had supervision over new construction only and had but one assistant, a bridge engineer. In fact, frequently these offices were combined. Now the chief engineer of a large railway has several assistants in charge of different departments, some of which are in turn sub-divided. The bridge engineer, engineer maintenance of way, signal engineer, architect, superintendent of water service, and superintendent of timber preservation have on many roads been required to build up staffs to handle the large amount of work under their supervision, larger than that formerly maintained by the chief engineer. The erection of a station is a good example of the wide diversity of problems met in one engineering project. Such a piece of work was a comparatively simple matter a few years ago. Now, however, the architect is called in to design the station, the passenger subways under the tracks are designed by the bridge department, the engineer plans the track layout, and the plumbing,

lighting and heating all require specialists, while the chief engineer must be able to intelligently supervise the combined work.

THERE is no time which so taxes the ability of the maintenance of way officer as a period of weather similar to that of the past three weeks, unless it is a series of washouts. It is even doubtful if washouts are as severe a test of a maintenance organization as the recent extremely cold weather, accompanied, as it was, by a heavy snowfall, for the weather conditions have been such that a man could not work without serious bodily discomfort, and frequently serious injury by freezing. Coming at a time when the forces are reduced to a minimum, severely cold weather in many cases finds the maintenance forces inadequate to cope with the situation. Conditions are especially severe about terminals, and the larger the terminals the greater the difficulty. Switches must be kept open throughout the yards, tracks about the engine houses and in coach yards must be kept free from ice in spite of the fact that water and steam are constantly escaping and freezing, for it is highly important that passenger trains at least be able to leave terminals on time. All this work requires constant attention both day and night and at such times the roadmaster or the supervisor usually spends a large portion of the 24 hours on the track. The same difficulties are shared to a somewhat lesser extent by those in charge of water service and signals. If passengers complaining of delays to passenger trains, or shippers of delay in delivery of freight, would realize the efforts put forth by employees in all departments, and especially of those in the maintenance department, to keep trains moving under the extremely severe weather conditions and would more fully appreciate the difficulties under which they work, there would be few, if any, complaints.

IF asked the cost of a work train the average roadmaster or master carpenter will mention the figure given in the general circular covering such work. But this figure may or may not be near the actual cost to the railway in a given instance. The average maintenance officer will order a work train too often rather than not often enough if left to his own judgment. For this reason it is very pertinent that he stop to consider what really enters into the cost of a train. The price given in the general circular usually is an arbitrary figure made to cover the average cost on the entire system. The cost varies widely on different divisions and on branches of the same division. A work train can do less on a busy main line than elsewhere, because of the time lost in keeping out of the way of scheduled trains; and it is a cause of delay to extra trains. The resulting overtime of train crews is an actual part of the cost of the work which the railway has to pay, although it may not be practicable to so assign the charges. Again, in times of congestion of traffic when motive power is scarce an engine is worth far more than in times of light business, because of its greater earning power. If an engine can earn \$200 a day by hauling revenue freight it really costs the road that much to withdraw it for work train service. The complicated wage schedules of the train and enginemen are often not as fully understood by the maintenance men as they should be, and because of this trains are sent back and forth over the road, running up mileage without securing the greatest results. These and other items enter into the real cost of doing the work. The closer the man in charge estimates this cost when deciding on the method to be followed the nearer will he be able to so do the job as to promote the best interests of the company. A roadmaster on a busy double track line, handling over 50 trains in 24 hours, most of them in the day time, called for a work train recently to unload seven cars of cinders about a mile out from the nearest siding. His superior officer studied the matter and found that a gang of about 30 men would be necessary to economically unload the cinders in the short intervals during which they could work on the main line. He therefore concluded that it would be cheaper to haul them

by teams from the adjacent siding. The total expense incurred in this way was less than would have been the cost merely of the labor which would have been necessary in handling it with the work train. In addition there was no interference with traffic on the main line. While the maintenance officer usually does not have the data to estimate accurately the cost of a work train, he is closely enough in touch with local operating conditions to arrive at the approximate figure, and should consider carefully these possible variations from the average cost.

MAINTENANCE WORK IN 1911.

IN looking back over 1911 the tendency which stands out most prominently in maintenance of way work is the very general effort to introduce economies. While retrenchment did not approach the limits reached in 1908, little attempt was made to raise the standards of maintenance or to do extensive new work. But a small amount of new construction, double-tracking and terminal improvement was done. In some cases the usual quantities of rail and ballast were not supplied. There were, in consequence, smaller forces to handle, which gave the supervising officers more time to study possible economies; and probably few recent years have witnessed so great an improvement in the thrift with which track work has been done. Few radical changes were made; the tendency was rather toward comparatively small improvements in many directions. The effort was largely to secure greater efficiency from the men through education and through more effective organization of the competent groups.

The idea that a track man is an unskilled laborer has been allowed to take root so firmly that it will probably take years to remove it from the minds of many, and in the meantime maintenance work will continue to suffer. However, there is a growing dissatisfaction with this attitude which is beginning to make itself felt. One evidence of this was the increase in the wages of section foremen on many roads during the past year. This ought to continue until the wages and conditions of employment are such as to induce enough good men to enter this field to provide a satisfactory supply of foremen.

The educational work for employees which was begun on the Union Pacific over a year ago was carried on actively during 1911. Last summer the courses were extended to the Illinois Central. The effect on the better class of foremen and maintenance employees seems sure to be beneficial. Many roadmasters and master carpenters have continued to hold regular meetings of foremen to discuss subjects in connection with their work. The keeping of cost data of work under way, and its comparison with previous work, has also proved instructive in many cases.

The most important result of the study of the organization of gangs is seen in the tendency to reduce their size. During the last few years many have realized that with the increasing inefficiency of labor greater supervision is necessary, and that it is impossible for a foreman, even with an assistant, to handle properly a gang of 75 or more men. One road has materially reduced the size of its ballast gangs during the past year and believes it has made a very large saving over previous years. The same thing has been done with rail-laying gangs, one instance of which is described in this issue. Study in this field has only begun and there is much room for further advancement. The premium system as a method of encouraging the foremen to better work was adopted last year on the Rock Island and has been continued on other roads.

There were few important developments in track materials, and the increase in the use of higher-priced materials for special service, such as screw spikes and manganese frogs and crossings, was checked by the curtailment of expenditures. However, there was an increase in the use of such standard materials as treated ties, tieplates and open hearth as well as Titanium steel for rails.

In view of the inefficiency of much track labor, the most attention is being devoted to the development of devices which will eliminate much of the work now done by hand. A rail-laying car is a prominent example of this kind of development last year. It is but the forerunner of a large number of labor-saving devices which will find their way into track work.

The introduction of motor cars for maintenance forces has increased very fast, and their use has demonstrated their economy. Some progress has been made in the adaptation of the motor on the car to driving power machinery in connection with track work.

Among the more interesting developments in handling maintenance work have been the experiment in maintaining automatic block signals on double track on the Union Pacific and the contracting of certain kinds of maintenance work on the Erie and Michigan Central, described in recent issues of the *Railway Age Gazette*. The year was productive of many improvements, and with the increased attention now being given to maintenance work by operating men, progress in succeeding years should be greater.

UNIFORM SPECIFICATIONS FOR TIE PRODUCTION.

ALTHOUGH many men interested in the railway cross tie problem have given the subject careful study, especially in connection with the work of the Wood Preservers' Association and the American Railway Engineering Association, there are still lines of investigation which have not been thoroughly studied, and much is still to be desired in the shape of actual results from such investigations. The work of the Wood Preservers' Association has, of course, been directed almost entirely toward methods of treating soft wood ties. The tie committee of the American Railway Engineering Association has recommended tie specifications and has made an attempt to secure service records. These records, however, have covered only the species of the wood and the treatment as influencing its life, and very little attention has been given to methods of cutting and handling the ties, which, in many cases, are important factors in determining the length of service which the tie will give.

The preparation of uniform specifications for tie production has been suggested at various times, but the number of varying conditions to be considered render this very difficult. Some roads have lines reaching tie-producing territory and buy all ties from local producers along such lines; others have to buy all ties from companies operating on a large scale in another portion of the country. Some roads refuse to take certain soft woods under any conditions; others use many soft woods, either treated or untreated. Conditions of climate and soil so influence the timber that a given species may exhibit quite dissimilar characteristics when taken from different sections; the season during which the tree can be cut to make a good tie may vary by several months, and the length of time required for freshly cut ties to develop incipient rot may also vary considerably. The method of handling the ties from the point of cutting to the point of delivery also greatly influences their value. They may be cribbed on a river bank for months awaiting a favorable stage of water and meanwhile developing rot; they may be rafted down stream immediately after cutting, the water soaking out the sap and retarding injurious checking, or they may be hauled out to a railway siding, properly piled and loaded direct to cars.

Unless ties are properly cut and seasoned before treatment their failure in the track may or may not be due to poor treatment. One of the papers presented at the convention of the Wood Preservers' Association cited an instance in which 90,000 beech ties were found to be in such bad condition after delivery to the treating plant that it was useless to treat them, and their first cost was a dead loss. Probably such cases are not common, but it would be hard to say how many failures of treated ties which puzzle maintenance men are due to some mishandling of ties before the treatment was applied. No road can experiment with all species grown in all territories and bought under all variations of specifications. Each road, however, is constantly learning by experience that certain species, cut in certain months and handled in a certain way, are giving either good or bad results in track. If by co-operation through the associations now studying the problem such experiences were exchanged, it is probable that certain general requirements in the production of ties could soon be made uniform, to the mutual advantage of tie producers, tie preservers and the railways.

IMPROVED MAINTENANCE METHODS IN 1911.

FIRST PRIZE.—ECONOMY IN MATERIAL.

BY P. H. HAMILTON.

St. Louis & San Francisco, Pittsburg, Kan.

The greatest improvement in the maintenance of way department on this division during the past year has resulted from the efforts made to economize and the willingness with which the foremen endeavored to help out is encouraging. In the past the foremen were not closely restricted in the hiring of men or in the use of material and there is no doubt that some injudicious foremen were wasteful in using new material where it was not fully needed simply because they had it on hand. On this road and on others this habit has been overcome by requiring the foremen to consult with the roadmasters before making extensive track repairs. The roadmasters also closely check the foremen's requisitions for material and tools, in this way preventing them from gathering an excessive supply. When a foreman is allowed to keep only a small supply of material and tools on hand he will be inclined to take care of what he has and will use it more carefully. By a small supply is meant enough material for general repair work and emergency repairs and enough tools to completely equip the gang. To cut down wasteful use of tools and to prevent them from being carried away the use of a mimeograph form of tool report has been started. This form is similar to a material report and all tools are listed on it. The foreman is required to account for all broken and worn out tools. One column shows the tools which can be spared for other sections, and another column lists those which will be needed for the coming month. From these reports the roadmaster can make up his monthly requisitions and distribute the equipment.

With the aim of receiving more credit for scrap released, the foremen have been urged to pay more attention to the picking up and handling of this material. In the past considerable scrap material has been stolen, but as a result of greater care on the part of foremen this trouble has been largely eliminated. After running the scrap car over the division the car department is always allowed to look over the material and pick out any which it can use.

A frog repairer at \$90 per month and his helper at \$60 per month spend their entire time going over the division repairing broken and worn frogs in track and those which have been removed for repairs. They also repair all of each foreman's tools before leaving his section. The cost of frog repairs, including bolts, rivets, springs and rails, rarely exceeds \$9 each. Before shipping scrap on sales orders it has always been necessary to cut frogs apart. Recently all the good parts have been saved for the use of the frog repairer. Recently while working over the scrap piles at division headquarters this frog repairer recovered in one week enough material to more than pay the wages of himself and helper for three months.

Considerable economies have been effected in the use of stationery. The foremen are now furnished with blank instead of printed letterhead paper. They are also furnished with self-addressed envelopes for their correspondence with the roadmasters, which envelopes are returned to them and used over and over. The roadmaster is provided with similar envelopes addressed to each foreman which he uses in the same way. This has decreased the use of the new envelopes in the roadmaster's department about 90 per cent.

Another thing which has been given attention this year is the maintenance of approaches to highway crossings at grade. In most cases track men have been maintaining these approaches in good condition out to the right of way line. Many times at the request of the township road supervisor a foreman will put in several hours with his entire gang on such work. With the increase in automobile traffic on the highways the maintenance of

these crossings has become more costly. Following the receipt of 15 complaints regarding the conditions of such crossings at one time recently the Kansas law relating to this subject was investigated by the legal department which made the following ruling:

"When the railway is constructed across a public highway, after the highway has been laid out and dedicated to public use, it is the duty of the railway company to restore the highway to its former condition, as nearly as practicable, and if in doing this it is necessary to construct approaches to the railroad track it should do that. If it is necessary to put drains in the approaches the railway is required to maintain these drains."

"When a public or private road is opened across railway tracks it is not the duty of the railway company to construct the approaches or put in and maintain the drains in the approaches. It is, however, the duty to plank the crossing by placing a plank on each side of each rail, these planks to be not less than 12 ft. long, 10 in. wide and not less than two in. thick, and shall fill the space between the two inside boards with gravel or broken stones, or shall floor the space with boards not less than two in. thick and 12 ft. long."

It is now the practice on this division for the foreman to only maintain the portion of the crossing between the ties. Wherever it is not a certainty that crossings were laid out and dedicated to public use after the railroad was built they maintain the drains under the crossings.

SECOND PRIZE.—EDUCATION OF THE FOREMAN.

BY M. GANLEY,

Roadmaster, Atchison, Topeka & Santa Fe, Argentine, Kan.

During the past year the following educational programme has been carried out on this division with good results and it is planned to continue it during the new year:

Meetings for the foremen have been held at intervals of about six weeks in which each one of the men was called on for a discussion of some subject pertaining to his work or to the safety of the employees. We have also discussed in a general way methods of getting along with the public living along the line, and especially with the farmers, with excellent benefits. I have found that by picking out subjects for some foremen whom it was difficult to interest otherwise and outlining the argument for them, and by assigning the opposite side of the same subject to another foreman at the other end of the territory, very valuable discussions will be brought out in such meetings, and often points are emphasized which had not been thought of before. In this way some of the men who are not able to work up a subject for the meeting bring out some of the most valuable discussions in debate.

It has been found of advantage occasionally to bring a track walker into these monthly meetings. While most of these men are foreigners and do not fully understand the English language, they have a chance to learn track work here and the roadmaster and foremen are enabled to get in touch with them. Such contact with them gives the roadmaster opportunity to study the more intelligent ones and to determine where he can secure his next foremen.

Last March I selected two of the foremen on the division and allowed them to attend the Railway Appliances exhibit at Chicago. This year the foremen will select two from their number to go, as it is believed that even better results will be secured by allowing the men to select their representatives. The men who attended the meeting last year noticed a great many new things in track material and tools which were of interest and value to them and which they have endeavored to explain to the other foremen.

Another good method of educating the foremen to see the

difference in the work of other foremen is to take them on an informal inspection trip over the division. Three or four of the foremen are gathered at one end of the division and go over it with the roadmaster on the rear end of some passenger train. In this way the small number of men does not annoy the passengers, while they secure all the benefits of a larger inspection trip.

EDUCATION.

BY E. R. LEWIS,

Division Engineer, Michigan Central, Bay City, Mich.

Reviewing the maintenance work of 1911 and considering the improvements made during this year as compared with the years gone by is undoubtedly of benefit. Is it not of equal or even greater service to consider now what improvements may be made in 1912 by the application of methods which have been tried in 1911 and found to be superior to those in use during former years? And may each one not benefit by some one or more of the "kinks" brought out through the agency of the *Railway Age Gazette's* contests during the present year? Improvements in track maintenance on the northern division of the Michigan Central during the year 1911 as compared with former years have been sought chiefly along the lines of increased efficiency through a policy of progressive organization.

The theory of scientific management, as applied to maintenance of railways, is at the same time plain and fascinating. It appears almost easy, at first glance. The putting of the theory into practice, however, reveals the real nature of the proposal. It is a matter of education, of man to man talks. It requires and demands the personal touch, toward a definite end. A beginning in this quest was made on this division in 1911. No startling innovations have been made. The roadmasters have been brought to the division office regularly once a month on the first Monday on or after the 15th and there have been no absentees. Efficiency methods have been discussed. Costs have been tabulated and compared. The knowledge imparted has been passed on to the section foremen, who take great interest in the matters considered.

Sketch blueprints have been distributed to the foremen showing the approximate position of each siding and turnout on each section. The length of every siding or spur is shown in figures while a summary in miles of main, passing, yard and industrial tracks, number of switches and railway crossings on the section appears in a compact table on the face of the blueprint which is of note book size, about 3½ in. x 6 in. In cases of sections in large yards, several blueprints, numbered to fit each other are necessary. Tracks joined with other roads are shown in colors. These prints are found very handy when describing the location of derailments or other happenings by the section foreman. By sending in his blueprint with the location marked, he can often explain what he could not otherwise make clear, and thereby do away with the necessity for a trip by the roadmaster or assistant engineer or both to view the premises. These blueprints have also been the cause of improvement of office records, the foremen being keen to observe errors in any detail. A most important result of the placing of these blueprints and cost data in the hands of the section foremen is their education in the reading of maps and masses of figures. The progress along these lines is remarkable.

The ultimate object of our efforts toward education is of course to reach and teach the section man: in other words, to increase the efficiency of the working unit. It does not seem that the railway managements of this country recognize or realize that the section man is a skilled laborer. To be of any use as a section man, a laborer must possess skill and experience.

The section man is the working unit. He should be, and often is, a sound thinking unit. A maintenance force is valuable in direct ratio to the knowledge and skill of the unit of organization.

It is, then, absolutely necessary to pick and train the section man if the efficiency of the department is to be increased as a whole and progressive results obtained. This must be done by daily instructions of all employees and officers. The knowledge gained must be passed down to the section men. But the superiority is not all on one side. There is often a passing up of knowledge, or even exchange of ingenious ideas and progressive methods. The roadmasters must bring the section foremen together. The foremen must bring the men together, to the mutual benefit of all concerned. These meetings and teachings must be persisted in and wisely carried out to be of value. There are altogether too many lines of cleavage in railway organization. They must be narrowed down, and gradually wiped out. Individual effort cannot avail. The best results are to be had from united effort—increased team work.

It is desirable and necessary to bring the section men into our confidence, to give them hearings, to know their views and to have them more clearly understand all sides of this great problem of transportation to the solving of which they are giving the efforts of their waking hours as the working units.

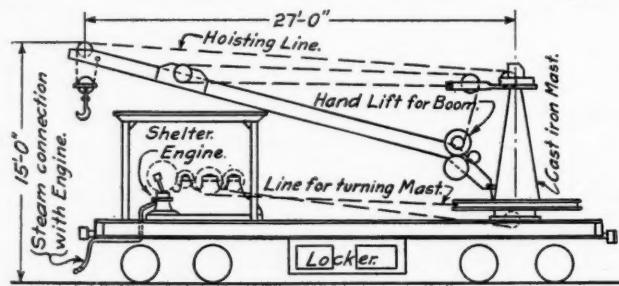
Here is the gist of the whole problem. Increased efficiency necessitates increased education in details of the work in hand, not only of the section man but of all the servants of the railways from the lowest to the highest. Along these lines the work of 1911 has been wrought. The results are encouraging. The field is far-reaching. The task is only begun. But the pathway is plain and the near future cannot but bring vast improvement. There will come a time when the value of the section man must be recognized by railway managements. Shall that recognition be forced upon unwilling ears or shall we set our house in order by recognition now of the true value of this working unit and by intelligent and constant effort toward its improvement for the lasting benefit of the employers? There is none too much time left.

THE USE OF A DERRICK CAR FOR HANDLING TRACK MATERIAL.

BY J. D. ARCHIBALD,

Assistant Supervisor, Northern Central, Baltimore, Md.

One of the laborious and dangerous pieces of work which track forces frequently have to perform is that of unloading frogs or other heavy track material from gondola cars. In addition to their weight, such articles are very awkward to lift because of the poor grip which it is possible to secure and very frequently a man has a foot crushed or is otherwise injured. Having a number of carloads of frogs and switches, in addition to a number of heavy manganese knuckle rails for slip switches,



Derrick Car for Handling Track Material.

to unload during the past summer, a derrick was secured from an adjacent division, but when it was received it was of very little use as it was equipped with a short steel boom of 10 tons capacity with a fixed radius of 10 ft. The car was sent to the shops and the boom was replaced with one having a radius of 27 ft., which allowed the hoisting line to reach the center of a 34-ft. car when coupled to it. This boom was arranged so that when out of service it could be turned through 180 deg. and allowed to rest

on the engine shelter, as shown in the drawing, in this way eliminating the idler car. No change was necessary for the engine or drums as the derrick was provided with one drum for hoisting and another for turning the mast. An old hand crab was placed on the boom for raising and lowering it. A man was selected from one of the gangs to operate the derrick, thus eliminating the steam engineer's wages.

In addition to unloading the frogs and switches, this car was used during the past season to move a standpipe about 200 ft. Here the plumbers dismantled the standpipe and disconnected the cast-iron seat and slow-closing valve. The derrick transferred the seat and valve to the new pit, requiring but a few minutes for work which would otherwise have required several hours for a gang of men. This car has also been used to good advantage in moving semaphore signal poles, only about 20 minutes being required to move a pole. This did away with the necessity of erecting gin poles.

The derrick was also found to be very convenient in loading a large quantity of rail for shipment. The chains were passed around several rails and they were hoisted into a car in one operation. Here two men were required on the rail pile and two in the car, with one man at the engine and one to give signals to the engineer. When loading by hand 16 men would have been required and would have made but one-third the progress made with the derrick. In such instances the use of a work-train is expensive, and the advantage of a derrick car is as important in the reducing of this expense as in the reduction of labor. The above are but instances of the wide variety of uses to which a derrick may be put with advantage.

BENEFITS OBTAINED FROM A CAREFUL STUDY OF THE COST OF WORK.

BY F. L. BURRELL,

General Foreman, B. & B., C. & N. W., Fremont, Neb.

"It is a good plan to hope for the best but a much better one to hustle for it." This is a fine maxim for anyone to follow, and the best way that one can obtain results is to keep his eye on his men and records, and hustle for a better record.

At the opening of the season of 1911 we called our foremen into the office and went over the records of the work done the previous year. The cost of this work was compared with the cost of that done in 1909 and if the 1909 cost was found to be lower than that for 1910 that figure was taken for the record of the two years; if the 1910 figure was lower we took that. An average cost for the different classes of work was made up and we started out with the intention of beating the record if we could.

It was not possible to eliminate all the undesirable men in our gangs at once, but we have made a reduction and believe we have reached a minimum. The men as a rule are taking pride in their work and are trying to make their respective gangs the best on the division. They have been given to understand that the word "efficient" does not mean spasmodic speeding up or poor work. It does mean the finding of a unit of work to be done in a given time in the most workmanlike manner and at the most economical cost. To accomplish results it is absolutely necessary to proceed without friction and with the most effective team work.

The men have been shown where head work can save unnecessary labor. Where possible cheap men have been put on for flagging trains and placing tools conveniently near to those who are paid higher wages to save the higher priced men from running from the work to the tool box and otherwise wasting time.

The foremen have taken a great deal of interest in this work and a number have kept diaries or logs of each day's progress. These have been turned in and have been found to be of much use in deciding where savings may be made the coming year. This action on the part of the foremen is of distinct value, for

we not only have a record of the work done with the method by which it was done and the cause for any extra cost, but we also have a record of any outside influence, such as delays caused by poor train despatching or poor work-train service.

An analysis of the results secured by working under the above program shows that while we have paid a little higher wages than in 1909, we have beaten the records of both 1909 and 1910. We have made an average reduction of 6 per cent. in the labor cost of work done, not including work-train and other service, while the foremen have made a decided advance in their efficiency.

ORGANIZATION OF RAIL RELAYING GANG.

BY R. C. WHITE,

Division Engineer, Missouri Pacific, Little Rock, Ark.

In contrast with the customary method of relaying rail with a gang of from 70 to 100 men in charge of a foreman and assistant foreman, gangs of 35 men with foreman and assistant foreman have been used on one division of the Missouri Pacific during the past year with excellent results. The detailed distribution of the men and the method of handling the work are here given.

On starting work in the morning six men begin adzing the shoulder of the tie on the outside of the rail and on a level with its base. At the same time nine men with claw bars are set to work pulling two spikes and starting the third spike, each man taking a rail and after finishing it going ahead to the ninth rail. Two men follow with spike mauls to drive down or pull out the stubs that the men in advance have left. Following this 16 men, under the direction of the assistant foreman, place the rails to be laid on the ends of the ties, heeling them in to the adjoining rails and directly opposite their final position in the track. These rails are turned on their sides with the ball towards the old rail and about 10 in. from it. One man carries water and one handles the tools.

A gang arranged in this manner will have from 5,000 to 6,000 ft. of rail in place by 10 o'clock. Such a gang should then be able to put in 160 rails in about three hours, with allowance made for at least six connections to permit trains to pass in this time. This still leaves four hours of a working day in which at least 40 more rails should be put in.

When starting to relay rail after 10 o'clock the gang is organized as follows: Two men flag trains; two with claw bars pull the remaining outside spikes and one pulls the spikes inside where the new joints will come; four with small bars throw the old rail out over the top of the new rail on to the shoulder of the ballast. The assistant foreman and an engineer with expansion shims at the rear end, with a laborer at the forward end, throw the new rail into place with small steel bars. Two men hold this rail in place while eight full spike it and eight others put on the bolts. Two men look after compromise connections; three distribute angle bars, bolts, spikes and other material and two carry water and do other miscellaneous work.

While daily records were kept showing the performance of various gangs it is almost impossible to arrive at accurate results by simply checking daily operations, which showed that a 38-man organization was laying from 80 to 160 lineal feet of rail per man per day. However, the actual cost of relaying 18 track miles of 75-lb. rail with 100-lb. rail, including the unloading and distributing of material and relaying 14 turnouts, is as follows:

Relaying rail labor, including foreman, assistant foreman and engineer	\$3,066
Relaying 14 switches—labor, including foreman, assistant foreman and engineer	490
Labor unloading 18 miles of rail and 14 complete switches.....	216
Work train, including fuel and engine house expense unloading rail and switches	620
 Total cost	\$4,392
Cost per mile, including switches, and unloading.....	\$244
Cost per mile excluding labor account laying switches and labor and work train account of unloading and distributing.....	177.33

Cost per track foot.....	.0335
Daily expense:	
1 Foreman (\$85.00 per month).....	\$3.23 per day.
1 Assistant foreman (\$65.00 per month).....	2.50 "
1 Assistant engineer (\$65.00 per month).....	2.50 "
35 Laborers (15c. per hour).....	52.50 "
38 men, or 380 hours.....	60.73 "
Cost of labor per man per day of 10 hours.....	1.60 "
Average track ft. per man per day (\$1.60 ÷ .0335).....	47.76 ft.
Average lineal ft. per man per day of 10 hours.....	95.5 ft.

The above work was performed with negro labor under ordinary weather conditions during the early summer. The average number of trains between 7 a. m. and 6 p. m. was 12; while the average number of connections made per day was 8.

ABSTRACT OF ENGINEERING ARTICLES SINCE DECEMBER 15.

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer, have appeared in the issue of the *Railway Age Gazette* since December 15:

Shallow Bridge Floors.—An abstract of a paper on this subject by O. F. Dalstrom, read before the Western Society of Engineers, was published on page 1268 of the issue of December 22. The author analyzes the subject completely and shows the differences between the various types of shallow floors now in use on railway bridges. An editorial commenting on the same subject appeared on page 1265 of the same issue.

The importance of properly inspecting and maintaining highway crossings over Railway Track was emphasized in an editorial note in the issue of December 22, page 1263.

New Construction in 1911.—The annual statistics compiled by the *Railway Age Gazette* showing miles of line built during the past year were published in the issue of December 29. The mileage for the year compared with the mileage built during the previous years as far back as 1893 is shown on page 1307, and a detailed statement of the mileage built arranged by states was published on page 1320. This issue also included statistics of mileage block signaled, cars and locomotives built and ordered, etc., and numerous expressions of opinion as to the outlook for 1912 by railway officers.

Notes on Pile Protection.—An abstract of an article read before the Boston Society of Civil Engineers by T. Howard Barnes, which includes a description of work done on wharf construction for the protection of piles, was published on page 1345 of the issue of December 29.

New Ore Dock at Two Harbors, Minn.—The Duluth & Iron Range ore dock recently built at Two Harbors, Minn., is one of the best examples of recent tendencies in the construction of ore-loading docks on the Great Lakes. Its size and the number of special features involved in its design make it of particular interest. An illustrated description of the structural details and operating mechanisms of the dock was published on page 8 of the issue of January 5.

The New General Office Building of the Union Pacific at Omaha.—The Union Pacific has practically completed a new 12-story office building at Omaha. A perspective view and floor plan of this building were shown in connection with a general description of its construction in the issue of January 5, page 18.

Exhibitors at the Railway Appliances Association March Exhibit.—The list of exhibitors for the March exhibition was published on page 65 of the issue of January 12, and an editorial note commenting on the outlook for this exhibit appeared on page 39 of the same issue.

The Rail Situation.—An editorial, presenting additional facts in substantiation of the statements made in an editorial on the subject of rail breakages, published December 15, appears on page 42 of the issue of January 12. This editorial includes summaries of the best statistics in existence on this subject.

Effect of Cold Weather on Tonnage Rating.—An abstract of a paper on this subject by Edward C. Schmidt, read before the

Central Railway Club; appeared on page 44 of the issue of January 12. It was illustrated by numerous curves showing the effect of temperature changes on train resistance as determined by an extensive series of tests by the Engineering Experiment Station of the University of Illinois.

Improved Method of Treating Ties and Timbers.—W. F. Goltra presents detailed plans for a timber preservation plant embodying a number of advanced ideas and including approximate costs of the process outlined.

COMMITTEE APPOINTMENTS; AMERICAN RAILWAY BRIDGE & BUILDING ASSOCIATION.

The following appointments have been made for the committees of the American Railway Bridge and Building Association for 1912:

Fireproofing Timber Trestles.—Lee Jutton (C. & N. W.); W. H. Moore (N. Y. N. H. & H.).

Derricks and Other Appliances for Handling Material in Supply Yards.—J. N. Penwell (L. E. & W.); A. S. Markley (C. & E. I.); A. Yappen (C. M. & St. P.); D. B. Taylor (B. & O.); E. A. Stanley (M. P.).

Sash—Size and Kind of Glass for Roundhouses and Shops.—A. A. Wolf (C. M. & St. P.); H. Bender (C. & N. W.); H. A. Horning (M. C.); F. L. Thompson (I. C.).

Concrete Tank Construction.—F. E. Weise (C. M. & St. P.); W. H. Finley (C. & N. W.); W. M. Clark (B. & O.); D. G. Musser (Penna. Lines West).

Best and Most Economical Pumping Engines.—C. E. Thomas (I. C.); J. Dupree (C. T. H. & S. E.); G. H. Jennings (E. J. & E.); J. B. White (C. & N. W.).

Roofs and Roof Coverings.—T. J. Fullem (I. C.); G. W. Andrews (B. & O.); C. W. Richey (P. R. R.); C. A. Marcy (C. & N. W.); J. H. Nuelle (N. Y. O. & W.); H. H. Kinzie (N. Y. N. H. & H.).

Reinforced Concrete Culvert Pipe.—L. D. Hadwen (C. M. & St. P.); H. H. Decker (C. & N. W.); R. O. Elliott (L. & N.); F. O. Draper (I. C.); F. E. King (C. M. & St. P.); George Loughnane (C. & N. W.).

The Construction and Maintenance of Long Pipe Lines for Locomotive Water Supply, Intakes, Pump Pits, Reservoirs, Etc.—B. J. Mustain (E. P. & S. W.); E. S. Hume (West. Australia Gov. Rys.); E. R. Floren (C. R. I. & P.); D. Burke (So. Pac.); W. C. Dale (O. S. L.).

The Development of Turntables to Meet Operating Conditions for the Modern Locomotive, Showing Most Improved Practice.—C. E. Smith (M. P.); J. S. Berry (St. L. S. W.); F. G. Jonah (St. L. & San F.); A. S. Markley (C. & E. I.); C. H. Fiske (M. R. & B. T.).

Track Scales—Construction and Maintenance.—A. M. Van Auken (M. D. & G.); E. R. Wenner (L. V.); A. W. Merrick (C. & N. W.); Wm. H. Vance (La. & Ark.); H. M. Jack (I. & G. N.).

Painting and Structural Iron or Steel, for Both Bridges and Buildings.—C. Ettinger (I. C.); R. H. Reid (L. S. & M. S.); E. E. Wilson (N. Y. C. & H. R.); O. F. Barnes (Erie); O. F. Dalstrom (C. & N. W.).

Relative Merits of Brick and Concrete in Railway Buildings and Platforms.—George W. Hand (C. & N. W.); H. A. Horning (M. C.); G. H. Jennings (E. J. & E.); Peter Hofecker (L. V.); W. F. Strouse (B. & O.); E. M. Dolan (M. P.).

The executive committee of the Roadmasters' and Maintenance of Way Association has decided to publish an official programme, which will be ready for distribution by July 15, 1912, and which will include the committee reports and papers which will be presented at the thirtieth annual convention at Buffalo in September. This will enable the members to study the reports before going to the convention and they will be better able to discuss them.

THE USE OF SECTION MOTOR CARS ON THE SAN PEDRO, LOS ANGELES & SALT LAKE.

An example of the economies secured by the use of motor cars for section forces is afforded by the experience of the San Pedro, Los Angeles & Salt Lake last summer. Although light motor cars have been used for inspection purposes by the superintendent, engineer maintenance of way, roadmasters and foremen of bridges and buildings for about eight years, section motor cars were first provided last year. Four Fairbanks, Morse & Company cars were bought and were placed in the hands of foremen, some of whom were white and some Japanese, and none of whom had had any previous experience with gasoline engines or motor cars. No attempt was made to pick out men to run them. As was to be expected, there has been some irregularity in their performance, partially due to the fact that they have not been continuously in the hands of the same men. The variations, however, have been such as may be readily understood and no difficulty is anticipated in reducing the performance to a fair degree of regularity.

The cars are being used on grades as high as 3.6 per cent. and it is found that they will carry a gang of five or six men with their tools up such a grade with a little pumping on the part of the men, the engine itself being not quite strong enough to climb the hill alone with this load. Reports of their performance are made monthly to the roadmaster and the division engineer, from which the following figures are taken. It will be noted that the cars average about 22 miles per gallon of gasoline and that the total cost of operation has averaged \$1.48 per 100 miles. The reports are posted daily by the foremen and summaries are made at the end of the month.

As a result of the experience with these cars authority has been granted to equip three branch lines throughout with motor cars. These branches aggregate 101 miles and have heretofore been divided into 11 sections. With the motor car but seven sections will be required, thus relieving four foremen with their hand cars, push cars and some tools. It is estimated that it will cost about \$1,500 to equip the seven sections with motor cars, and that the total cost of operating them for the first five

months will bring this amount up to \$1,800. The saving in wages, hand and push cars and tools will offset this expense, and after five months the annual saving in wages alone without reducing the number of laborers is estimated at a trifle over \$3,000. In addition to this, the local officials believe that they will get more efficient track work.

ERLECTION OF ROCK ISLAND BRIDGE OVER IOWA RIVER, COLUMBUS JUNCTION, IOWA.

The Chicago, Rock Island & Pacific has recently completed the reconstruction of a bridge over the Iowa river about 300 ft. south of the junction of the Iowa and Cedar rivers, near Columbus Junction, Iowa, in which the erection of the steel work was handled by a new and original method. This work was described in a recent number of the *Rock Island Employees' Magazine*, from which the following information is taken:

The old bridge consisted of six 150-ft. through latticed trusses and one 58-ft. deck plate girder over the channel of the river proper, with a series of 66-ft. deck plate girders on the approaches. The girders on the approach spans were supported on stone masonry piers. Three of the piers supporting the truss spans were also of stone and were constructed over 40 years ago. These piers were in such bad condition that they had to be replaced. The other piers supporting the truss spans were of concrete and were constructed about six years ago.

Although the through truss spans were in good condition, they were constructed several years ago and were not designed for the present day heavy traffic. For this reason their renewal became necessary and they were replaced by 11 deck plate girder spans, two of which were 75 ft. long, six 78 ft. long, and three 103 ft. long. These various lengths of girders were necessary in order to utilize the existing concrete piers. Six new concrete piers were built between the old ones in addition to the stone piers rebuilt, requiring in all 1,700 yds. of concrete.

Instead of following the general practice of supporting the old bridge and erecting the new one on false work, a new plan was adopted, in order to eliminate the heavy cost of the

MOTOR CAR PERFORMANCE ON S. P. L. A. & S. L.

JULY, 1911.

Car No.	Days in Use.	Miles Run.	Miles per gallon.		Cost per 100 miles, oil and gasoline.	Supplies, other than oil and gaso.	Repairs, labor and material.	Total cost per 100 miles.	Delays.	Remarks.
			Gasolene.	Lub. oil.						
5770.....	14	243	20.25	243	\$1.12	.....	.....	\$1.12	.....	Gasolene, \$0.20 per gal.
5617.....	28	641	23.31	427	.94	.....	.....	.94	.....	Lubricating oil, \$0.30 per gal.
5624.....	29	265	22.08	265	1.03	.....	.....	1.03	.....
Average.....	...	383	22.31	328	\$1.00	.....	.....	\$1.00	.....

AUGUST, 1911.

5770.....	31	294	17.29	98	\$1.50	\$1.82	.....	\$2.11	.....	Excessive oil used.
3476.....	31	407	16.28	136	1.47	.....	.....	1.47	.....	Excessive oil used.
5617.....	31	304	23.38	347	.95	.....	.....	.95	.....
5624.....	31	302	25.17	302	.91	.....	.....	.91	.....
Average.....	...	327	19.51	166	\$1.22	\$0.14	.....	\$1.36	.....

SEPTEMBER, 1911.

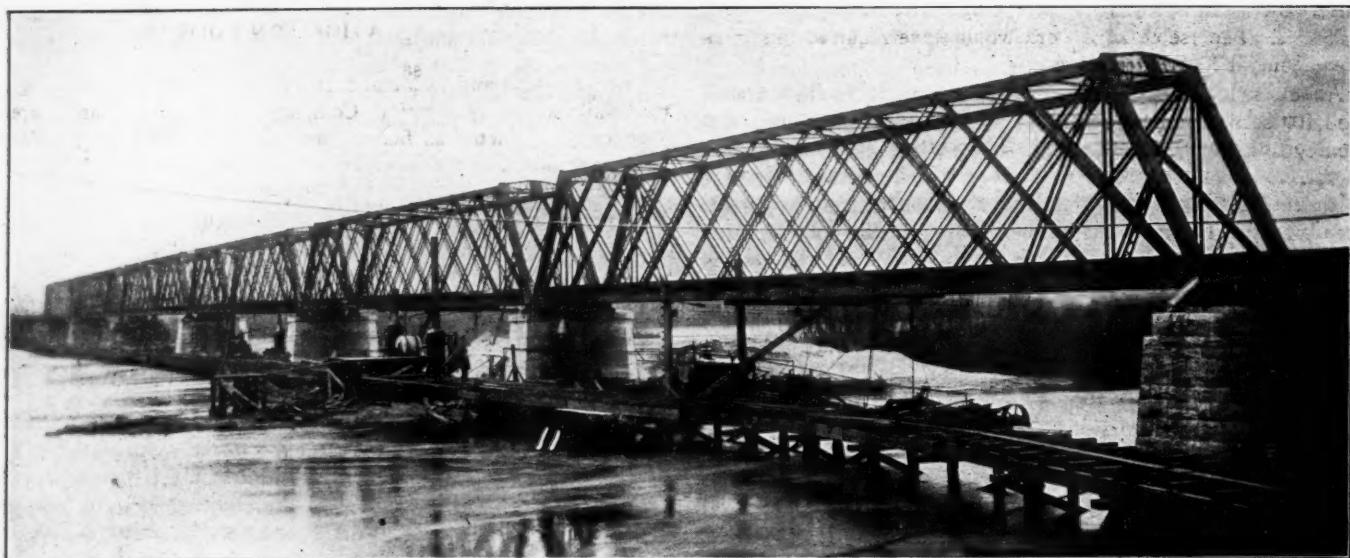
5770.....	30	341	24.36	248	\$0.95	\$1.68	.....	\$1.45	.....	Supply items are spark plugs and 15 cells, dry batteries.
3476.....	30	250	25.00	286	.92	.91	.....	1.28	.....
5617.....	30	413	22.94	300	.98	.....	.....	.98	.....
5624.....	30	294	24.50	336	.92	1.82	.....	1.53	.....
Average.....	...	325	24.04	288	\$0.95	\$0.34	.....	\$1.29	.....

OCTOBER, 1911.

5770.....	31	489	23.29	301	\$0.97	.....	\$3.60	\$1.71	.....	Cleaning engine.
3476.....	31	428	23.78	311	.95	.....	3.60	1.79	.....	Cleaning engine.
5617.....	31	184	19.37	245	1.17	.....	13.63	8.58	18 days	Damaged in collision. Fault of foreman.
5624.....	31	346	24.71	346	.91	\$1.82	.....	1.44	.....	8 cells, dry batteries.
Average.....	...	362	23.15	305	\$0.97	\$0.13	\$1.44	\$2.54	18 days	

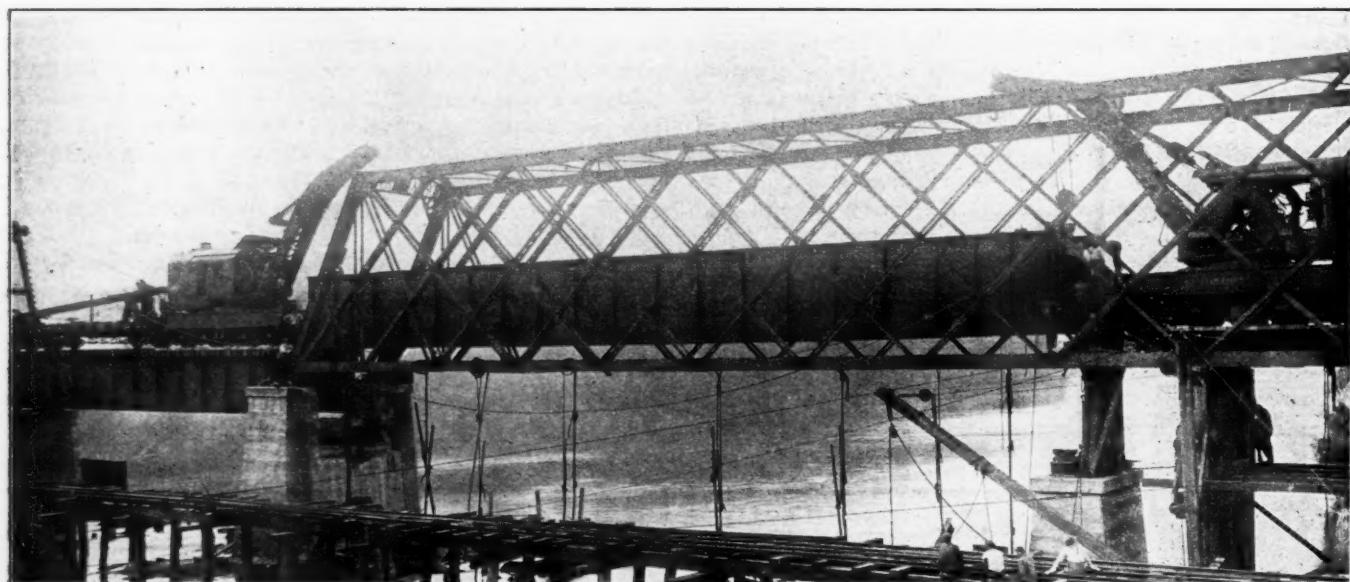
NOVEMBER, 1911.

5770.....	30	480	23.29	384	\$0.92	\$1.37	.....	\$1.20	.....	Supply items are 1 spark plug and 20 cells, dry batteries.
3476.....	27	509	25.45	407	.87	.....	.....	.87	.....	Dirty spark plug.
5617.....	30	588	22.62	314	.99	1.82	.....	1.30	10 min.	
5624.....	30	405	27.00	432	.82	2.47	.....	1.43	.....
Average.....	...	496	24.47	373	\$0.91	\$0.29	\$1.19	10 min.	
Average for 5 months.....	...	379	22.70	292	\$1.01	\$0.18	\$1.48	



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Old Rock Island Bridge at Columbus Junction, Iowa.



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Lowering 103-ft. Girders Into Place With Steam Wrecking Cranes.

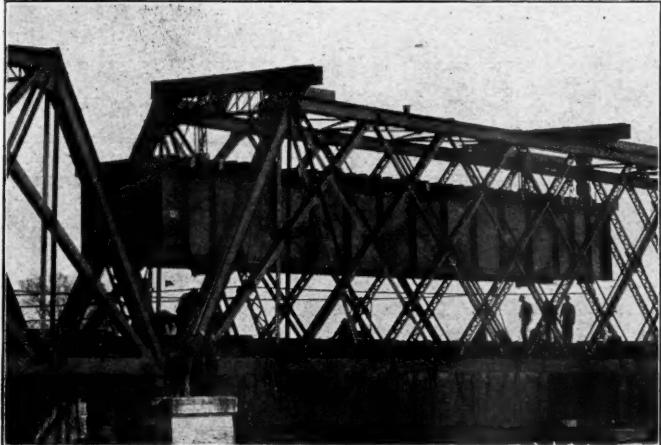


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Completed Bridge Over Iowa River.

false work and the danger of its being carried away or injured by floods. The use of false work would have required this work to be done at low water stage.

As many rivets as could safely be spared from the floor system of a truss were cut off in advance, and the top laterals and one portal were removed. Two heavy steel beams with steel pins from which block and tackle could be suspended were then placed on top of the trusses over the locations of the ends of the girders to be placed, as shown in the smaller photograph. Two sets of blocks were suspended from each beam. The girder span to be placed was riveted up and placed on two flat cars with half the track ties in position on it. When everything was in readiness a train, consisting of an engine, a flat car arranged so that the lines from each set of blocks could be attached, two cars loaded with the span to be placed, and a derrick car, was run on to the bridge. The cars holding the girders were spotted so that these girders were directly above their final location, and block and tackle were hooked on to each end of the girders. Lines from these blocks were attached to the flat car next to the engine, which had been moved ahead three or four car lengths. The engine then moved slowly forward lifting the span clear of the cars, which were then shoved out of the way. The girders were held suspended by the engine until the track and floor system of the old bridge were removed. All



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Lowering Girders Into Place by Block and Tackle.

the remaining rivets in the floor system were taken out. Two runner lines from the derrick car were then hitched to a floor beam and it was raised clear of the bottom chord of the trusses, when both the floor beam and stringers were quickly dropped into the river and recovered later. After the floor system was out of the way, the girder span was lowered into place by the engine, the rails laid on the ties and traffic resumed. The best time made in placing one of the shorter spans was 1 hour and 25 minutes from the time the track was blocked until traffic was resumed. Because of their great weight, the 103-ft. girders were placed by two wrecking cranes, as shown. The longest time required in placing one of these girders was three hours. In placing these 11 new spans and taking down the eight old ones, no train was delayed, although it was necessary to handle a traffic of from 10 to 15 trains during working hours.

When the girders which replaced the truss spans had been set the trusses were braced and supported from the new girders to provide for wind stresses until they could be taken down piece by piece by the derrick car. The practicability of this method, as compared with false work, is shown by the fact that three of the trusses were replaced during the highest flood stage of the river, at a time when false work would have been torn out by the ice and drift. The handling of this steel work was all done by company forces under the general direction of J. B. Berry, chief engineer, and I. L. Simmons, bridge engineer.

NEW SEATTLE TERMINALS; OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY.

The new yard and terminal facilities of the Oregon-Washington Railroad & Navigation Company at Seattle, Wash., are practically completed as far as they will be built at the present time, and most of them are now in regular service. They were made necessary by the inauguration of train service into Seattle by the Oregon-Washington Railroad & Navigation Company on January 1, 1910. The establishment of regular independent train service by the Harriman Lines between Seattle and Portland forms the closing chapter in the history of the efforts of this system to enter the Puget Sound territory, which had been previously occupied exclusively by the Hill Lines. This contest had reached the stage where the O. W. R. R. & N. had started the construction of its own line and had completed 3,000 ft. of tunnel in Tacoma when negotiations were consummated for the perpetual joint use of the Northern Pacific tracks from Portland to Tacoma and the temporary use of their tracks from Tacoma to Seattle. Since that time a new track has been built jointly by the O. W. R. R. & N. and the Chicago, Milwaukee & Puget Sound from Tacoma to Black River Junction, nine miles from Seattle, and a line was built independently by the Harriman line from Black River Junction to Seattle.

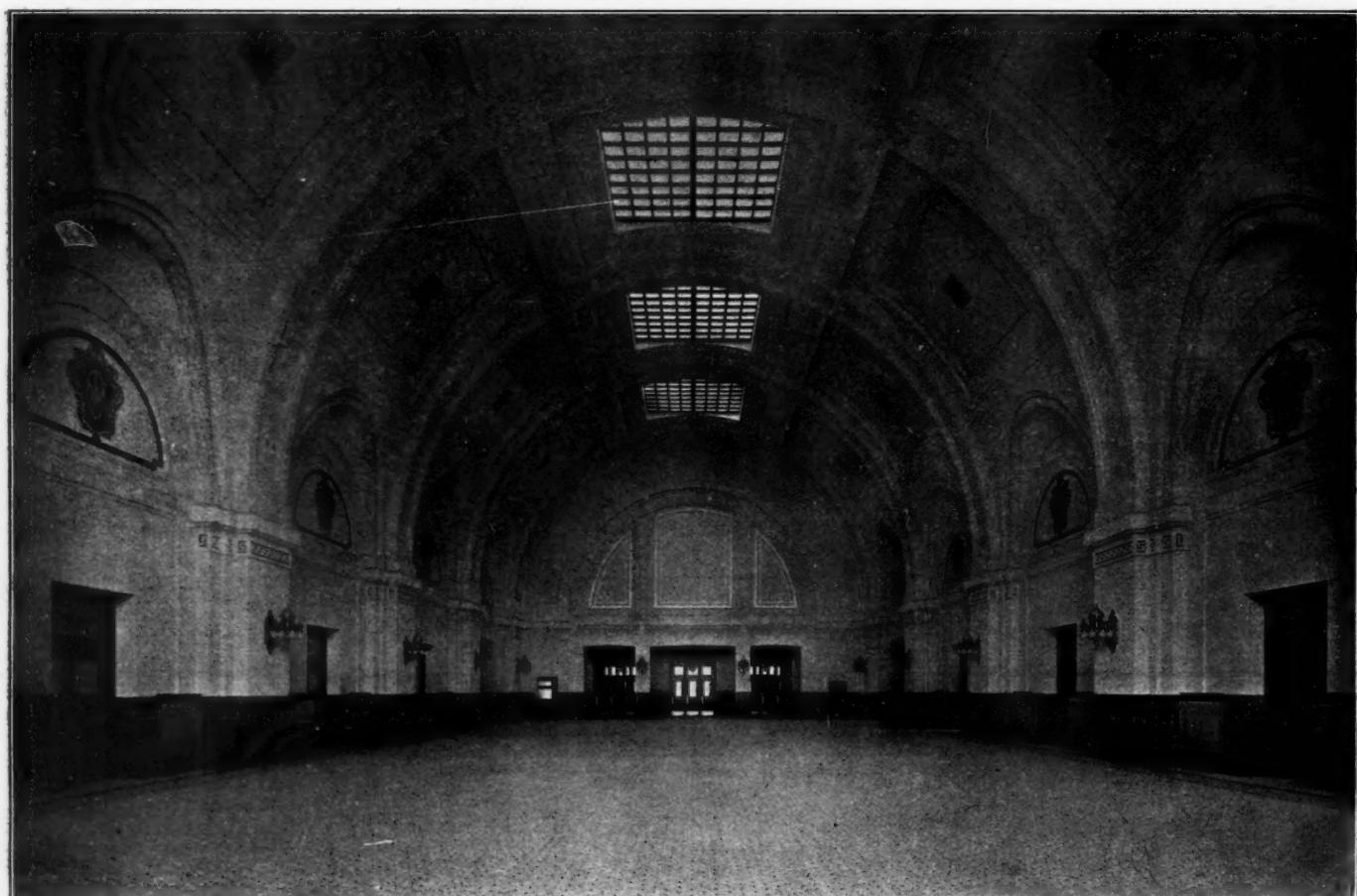
Because of this entrance into Seattle entirely new freight and passenger terminals were necessary. The arrangements for the joint use of the Northern Pacific tracks were not concluded until about December 21, 1909, and passenger service was inaugurated on January 1, 1910. This gave but ten days to make preparations to handle the engines and equipment. The land for terminal facilities had been secured before an entrance into the city had been decided on. A temporary terminal was hurriedly provided. A frame enginehouse, boilerhouse and sandhouse were erected and a small coach-cleaning yard was equipped. A temporary passenger station was erected on the site of the proposed permanent local freight station. When the first train entered these temporary facilities were ready and remained in operation until replaced by the permanent structures. In the two years since the inauguration of this service a complete terminal layout has been built and today modern passenger and freight stations and a freight yard, with engine house coal chute, storehouse and other buildings, have been completed. Six passenger trains and several freight trains now enter and leave Seattle daily over the O. W. R. R. & N.

The most prominent feature in the Seattle improvements is the new passenger station which was opened on May 20, 1911. This station faces north on Jackson street and is directly across Fourth avenue from the Northern Pacific-Great Northern station. The building is of concrete and steel construction, with brick curtain walls, and white artificial stone trimmings. It is three stories high above the street, while the track level is depressed 24 ft. below the street. The general waiting rooms are located on the first floor, while the second and third floors are devoted to offices. The C. M. & P. S. uses this station under arrangements made subsequent to its completion. Additional details of the station, together with plans showing the track layout, were given in the *Railway Age Gazette* of January 21, 1910.

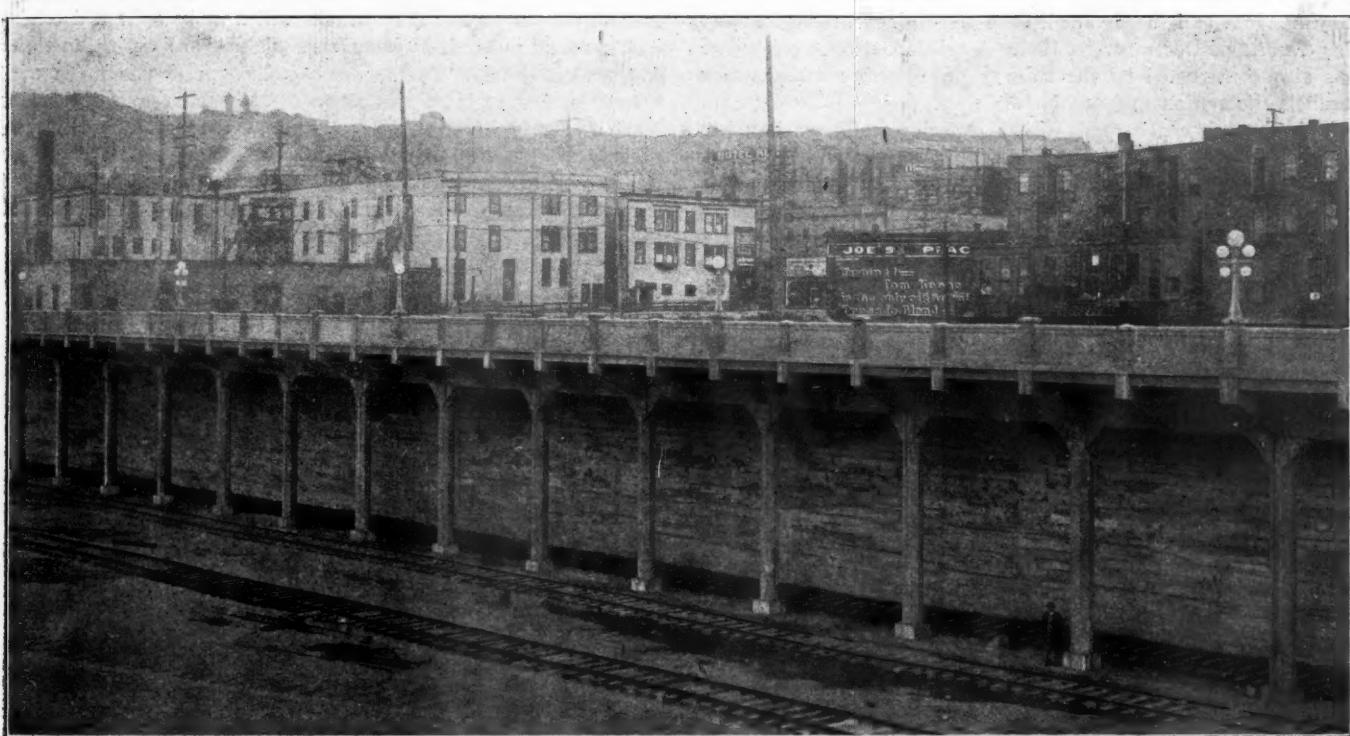
By depressing the tracks, grade crossings at Seattle boulevard, just south of the station, and of Jackson street, just north of the station, were avoided. This depression required heavy concrete work, both in the viaducts carrying Seattle boulevard and Jackson street, and in a heavy retaining wall just east of the station, supporting the west side of Fifth avenue. The adoption of a special design for this wall allowed Fifth avenue to be widened without any loss in track room below. That portion of the roadway above the tracks is supported on a concrete floor, one side of which rests on the wall and the other on reinforced concrete posts, spaced 20 ft. center to center. The sidewalk is carried by cantilever construction, extending beyond the posts. This arrangement allows one track to be laid between the line of



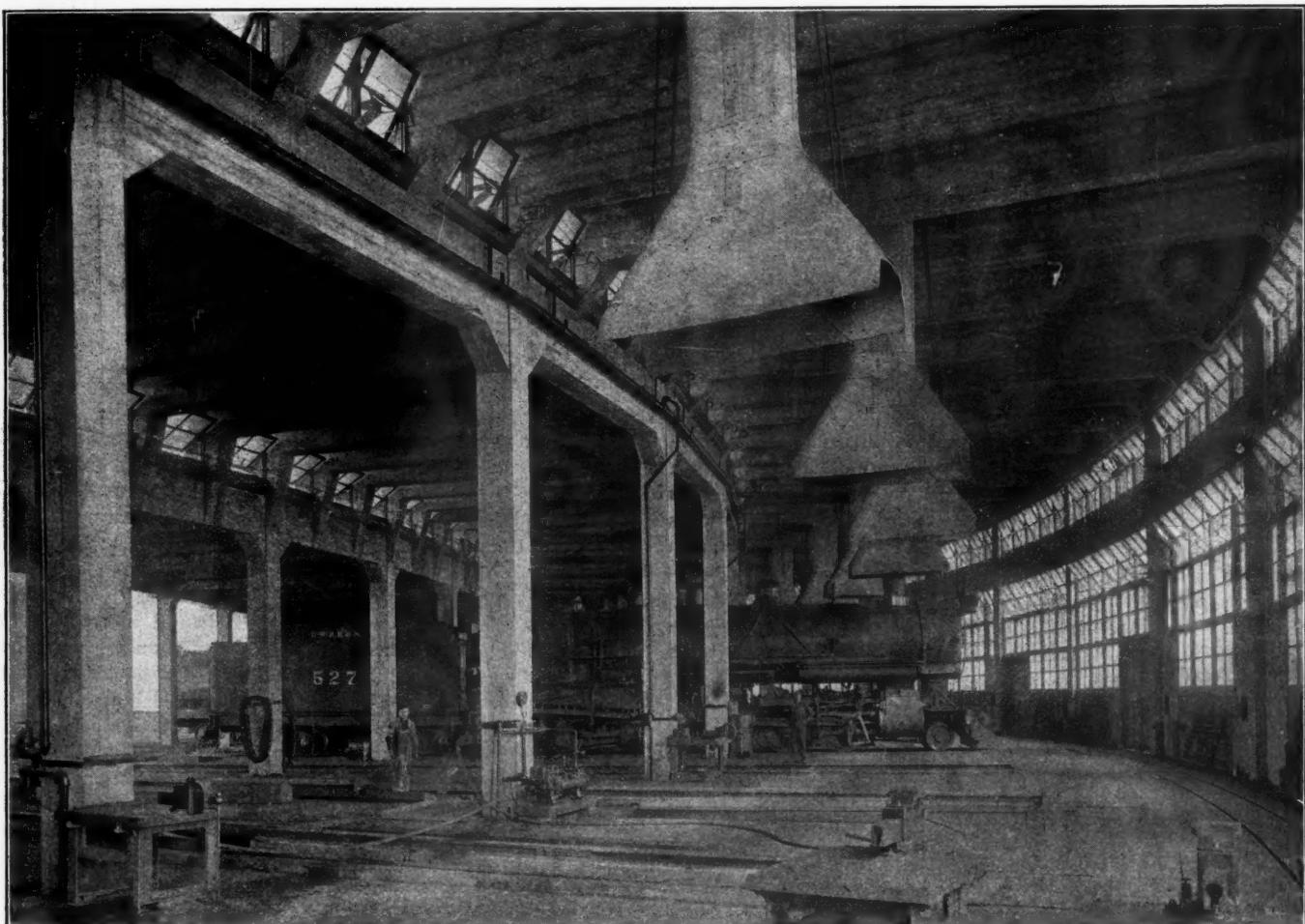
Oregon-Washington Railroad & Navigation Company's Station, Seattle, Wash.



Main Waiting Room of the Station Before the Seats Were Placed in Position.



Retaining Wall at Fifth Avenue, Seattle.



Interior of the O. W. R. R. & N. Co.'s Engine House, Argo Yard, Seattle, Wash.

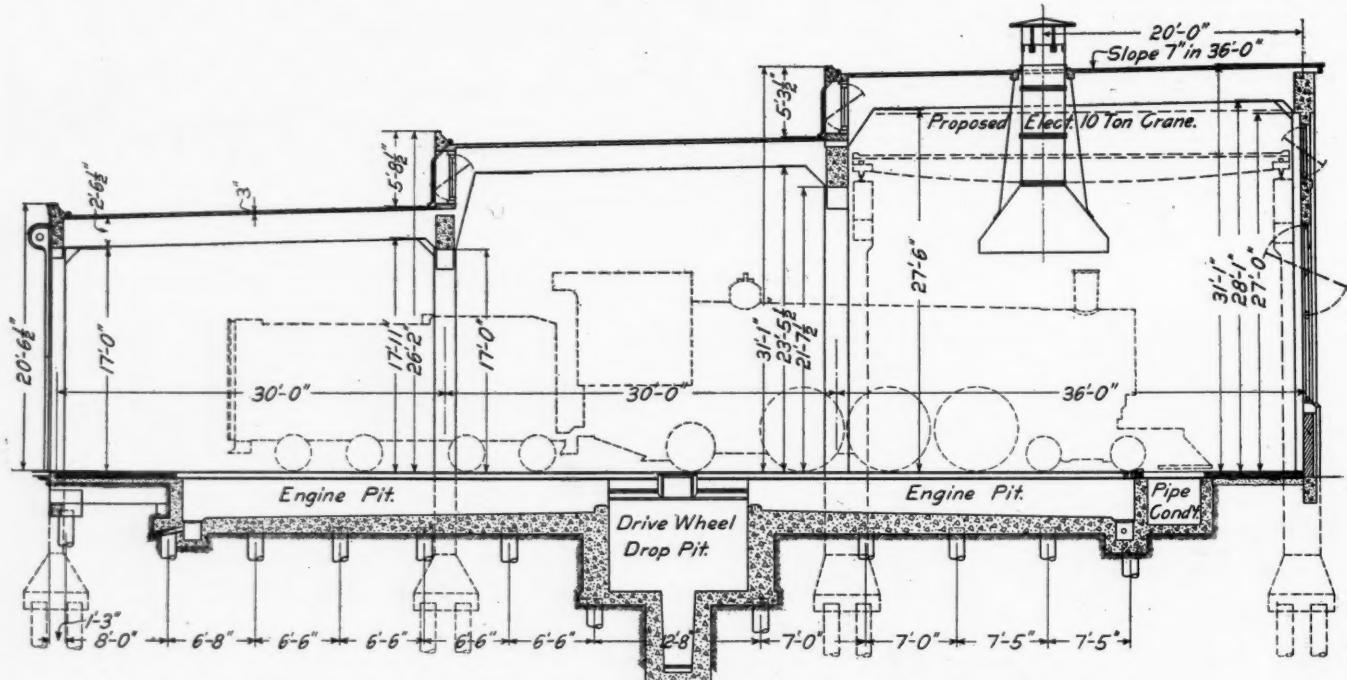
concrete posts and the wall. This wall is shown in the accompanying view, and the detailed plans were given in the *Railway Age Gazette* of December 16, 1910. A reinforced concrete bridge was also constructed by the railway on Fourth avenue, which parallels the station grounds on the west.

A three-track coach yard, with a capacity of 62 coaches, has been built just south of the station where coaches will be stored. It is planned to build four main tracks from the station across the tide flats to Argo yard, 3 miles south, but only two tracks are being built at the present time. They crossed these flats, which are submerged at high tide, on long wooden trestles which were filled in completely before service was inaugurated. The recent report of the Municipal Plans Commission of Seattle, published in the *Railway Age Gazette* of November 24, 1911, recommended that these tracks and the Argo yard be elevated above the level of proposed streets. This recommendation will be voted on soon by the citizens of Seattle.

A freight station has been constructed in the wholesale district between Railroad and First avenues at Dearborn street, which includes an inbound freight house, 800 ft. long x 50 ft. wide, and an outbound house 580 ft. long x 30 ft. wide. Only the

this area and providing for a considerable increase over present needs. Only a part of these tracks will now be built and others will be added as needed without necessitating any change in those tracks already laid. At the north end connection is made with a spur leading to industries along the Kitsap avenue docks and Harbor Island. The Argo crossing at the south end of the yard is the busiest railway crossing in Seattle, probably one of the busiest in the West, and plans are nearing completion for a modern interlocking system to be installed by the companies interested. Sixty-four first-class and 30 second-class train movements are scheduled across this crossing daily, in addition to extra freight and switching movements.

When finally completed the main yard will consist of a 10-track receiving yard, a 7-track departure yard, a 9-track additional receiving and departure yard and a 21-track storage yard. Two running tracks will extend around each side of the main yard and there will be one running track on each side of the departure yard. Two additional storage yards are planned north of the main yard. Of this layout the two running tracks on the north side and one on the south side of the yard, four tracks in the receiving yard and five in the departure yard, are now built.



Cross Section of the Argo, Seattle, Engine House; O. W. R. R. & N. Co.

north, 320 ft. of the inbound house, is constructed at the present time. Six tracks will be built between these houses with a 12-ft. platform, with an umbrella canopy between the middle tracks. Teamways are provided along Railroad and First avenues for the loading and unloading of freight. All platforms, both on the team and track sides at both houses, are protected by canopies covered with wire glass. All construction is of reinforced concrete. The floor consists of 6 ins. of concrete, with a one-inch asphalt wearing surface. Reinforced concrete fire walls are provided in both houses at intervals of about 150 ft.

The new terminal freight yard and facilities are located about 3 miles south of the passenger station in the suburb of Georgetown, recently annexed to Seattle. At this point a large tract of low, unimproved land was secured some time before the final arrangements were made for inaugurating service. This tract extends northwesterly, about 1 1/4 miles, from the Argo crossing with the Northern Pacific. Entrance to the yard was secured temporarily by a single track lead connecting with the O. W. R. R. & N. main line at this point, which lead is now being double-tracked on its permanent location. In designing this yard plans were made for a large terminal covering practically all of

The ladders are laid on a No. 7 angle and No. 7 frogs are used throughout the yard, except at connections with the main line, where No. 10 frogs are used. New 75-lb. rail is used, and all curves and leads are tieplated. Because of the crossings at the south end of the yards, all switching will be done at the north ladders.

The yard is a flat yard built on a fill, averaging 6 ft. About 400,000 yds. of filling material have been hauled in from Black River Junction, where cuts have been widened on the new line. This earth was handled by contract and was hauled about 6 miles over the main line. Most of the material was in place before regular train service was established, although some hauling continued after traffic was turned over to this line, the hauling trains then working only under the direction of the dispatcher. The grading has been discontinued now as embankment has been provided sufficient for 10 additional tracks.

One of the special features of the yard is that, with the exception of the coal chute, all buildings are of reinforced concrete construction. A 10-stall enginehouse, with a locker room, storeroom and a boiler washing system occupying the space of another stall, has been built. The stalls are 96 ft.

long, and drop pits are provided under the three stalls at the west end. The floor is of creosoted wooden blocks. The building is well lighted and ventilated by windows in the sides and end, and lights are placed in the vertical portion of the roof. Vertical rolling lift doors are used at the inner circle entrance to the house. A 2-ft. gage track is laid in front of the stalls for use in transferring heavy materials from one part of the house to another. A temporary 12-in. brick wall placed at the west end of the house to be removed when the house is extended. The reinforcing bars in the concrete are allowed to project beyond this wall so as to form a future bond, as shown in one of the photographs.

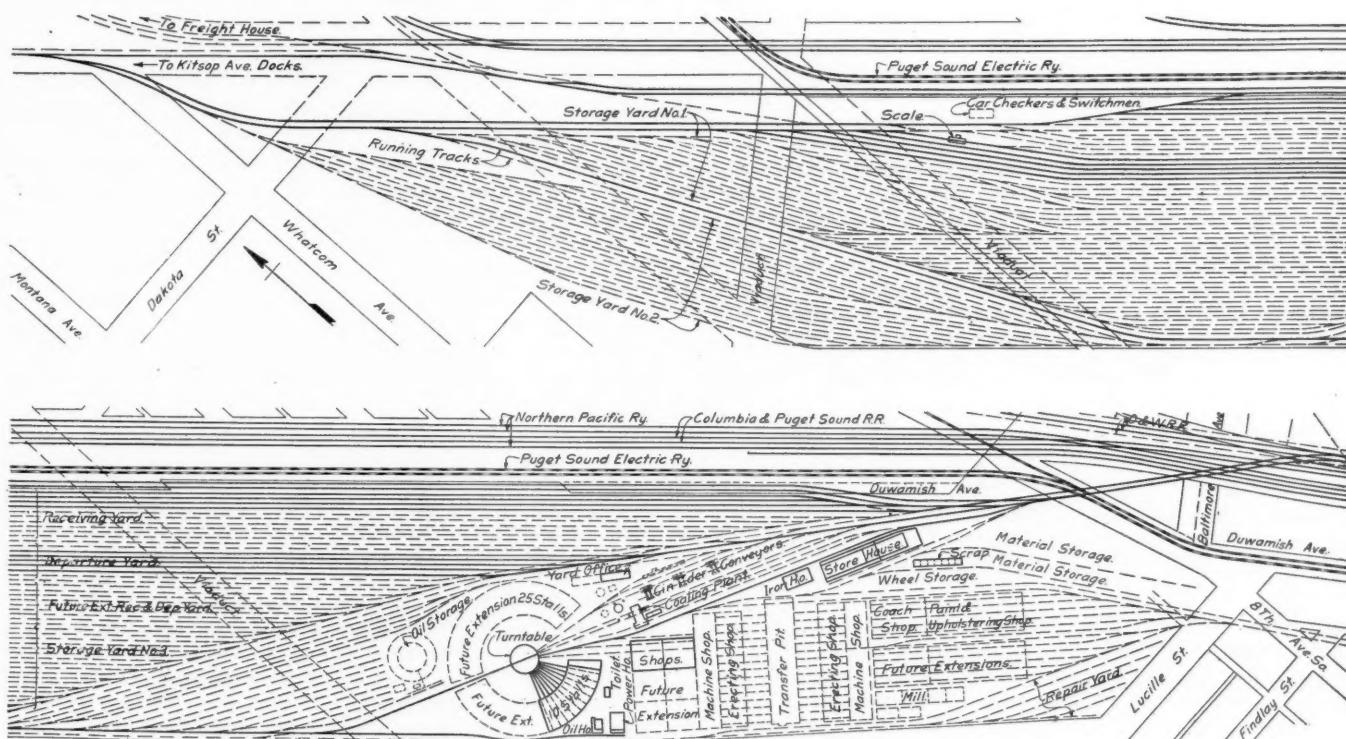
The use of coal is somewhat of an innovation on the western Harriman Lines where oil has been used extensively, but was adopted here as a result of successful tests recently made with lignite by the O. W. R. R. & N. A. Holmen type coal chute, with a 2½-ton double lift counterbalanced bucket, was erected on concrete foundations. Two Robinson pneumatic cinder conveyors are installed.

A three-story storehouse, 40 ft. x 100 ft., and a yard office,

All concrete work was done by contract. The company furnished the cement and reinforcing steel bars, and the contractor furnished all other material and labor. This work was done under the direction of John D. Isaacs, consulting engineer of the Harriman Lines; J. R. Holman, assistant general manager, O. W. R. R. & N., and C. C. Berkley, assistant engineer in direct charge of the work.

In laying track with a tracklaying machine on the Pecos & Northern Texas it was found that the oil dripping from freshly-treated ties soon resulted in the rails becoming slippery, making it difficult for the machine to grip them and frequently breaking the driving chain.

The Nashville, Chattanooga & St. Louis has adopted the practice of placing one switch-point, together with the necessary guard rail, ahead of the other point on sharp curves and finds that this arrangement effects quite a saving in the wear of the points.



Track Layout at the Argo, Seattle, Terminal of the O. W. R. R. & N. Co.

Tracks shown in full lines now laid. Those shown by dotted lines will be added in the future.

are built of reinforced concrete. In the yard office individual lockers are provided for each switchman and the same provisions are made for other employees in the other buildings. Hot and cold water and electric lights are provided in all buildings, and there are independent sewerage facilities.

There is a 65,000-gal. steel tank, resting on a steel tower on concrete pedestals. An 80-ft. turntable is installed on a concrete base, and a 60-ft. 100-ton Fairbanks, Morse & Company automatic registering scale, on a concrete foundation, is provided near the north end of the yard. All streets crossing this yard are vacated, with the exception of First avenue, which crosses on a long timber viaduct. As the yards were made on a fill, piling was placed under all foundation walls.

Work still under construction, to complete the facilities to be provided at present, includes a concrete machine shop, 90 x 180 ft., a powerhouse with reinforced concrete chimney, electric wiring system, piping system and the completion of a sewer system.

A committee of the Canadian Society of Civil Engineers has recommended that experimental tests be made with ties 10½ ft. long, the reason for adopting this length being that it is believed the distance from the center of the rail to the end of the tie should be the same as from the rail to the center of the track. As the ties are now spaced as closely as practicable the only alternative to securing a greater bearing surface is to lengthen them.

The roadmaster on the Eastern Kansas division of the Santa Fe has devised an insulated end post which eliminates much of the common trouble with the fibre end posts cutting and mashing out in the tests made so far. A steel post $\frac{1}{8}$ in. thick is cut from a rail of the same section and inserted with the fibre, forming a buffer for the rail. The side that is next to the fibre is dressed smooth and does not cut the fibre post. Four such joints are now in service experimentally on this division and are giving good satisfaction.

WOOD PRESERVERS' CONVENTION.

The eighth annual convention of the Wood Preservers' Association was held in the Hotel Sherman, Chicago, January 16-18. The opening meeting on Tuesday morning was called to order at 10:30 by President John T. Logan. The officers of the association for the year just closed are as follows: President, John T. Logan, president National Lumber & Creosoting Company, Texarkana, Ark.; first vice-president, Andrew Gibson, superintendent T. P. & T. T. plants Northern Pacific, St. Paul, Minn.; second vice-president, R. J. Calder, secretary and treasurer International Creosoting & Constructing Company, Galveston, Tex.; third vice-president, D. Burkhalter, superintendent creosoting plant, Buffalo, Rochester & Pittsburgh, Bradford, Pa.; secretary and treasurer, F. J. Angier, superintendent timber preservation, Baltimore & Ohio, Baltimore, Md.

In his opening address President Logan commented on the growth of the association both in membership and prestige and emphasized the necessity of meeting the problems in connection with the growth and development of the industry by methods in keeping with present-day industrial practices. A committee presented a resolution expressing sympathy for the family of C. D. Chanute, one of the active members of the association who died during the past year, the resolution being unanimously adopted. W. F. Goltra presented a fitting tribute to Mr. Chanute and his father, Octave Chanute, who died about one year earlier.

The report of the secretary-treasurer showed the association to be in excellent condition financially and to have made a remarkable growth in membership during the year. The balance on hand in the treasury is \$529.89. The increase in membership for the year is 46, making a total membership at present of 104.

A paper on Creosoted Wood Paving Blocks was read by A. E. Larkin, general superintendent Republic Creosoting Company, in which the following points in connection with the production of wood block pavements were brought out. The wide variation in the qualities of different species of wood have made it necessary to limit very closely the rules under which paving blocks can be successfully produced. This production involves the cutting of the timber, storing, seasoning, shipping, sawing of the planks, treatment, etc., in each of which there is opportunity for faulty methods to injure the value of the final product. The problem of securing efficient and equitable inspection of blocks is a matter that it is difficult to agree upon between producers and purchasers. A final inspection before laying in the street is recommended as sufficient. The use of original specifications rather than standard specifications is not considered advisable.

A paper on Wood Block Pavement from a Construction Standpoint was read by Day I. Okes, of the Kettle River Company. The most essential factor in the life of creosoted block pavements is the foundation. This foundation should have a smooth surface and should be covered by a cushion never exceeding one inch in thickness and used only to obtain a smooth wearing surface for the blocks. Sand is usually specified for this cushion, although in cases where the pavement is subject to vibration a mortar cushion is preferable. It is usually conceded that block pavements wear best when the blocks are placed at an angle of 45 to 67½ degrees with the curb.

A paper on Preservation of Power Transmission Poles by W. R. Wheaton, timber engineer, San Joaquin Light & Power Company, discussed the results of a series of tests made under the direction of the author on about 600 poles treated by various methods and compared with untreated poles under similar conditions, recommending a first class treatment of the butts of such poles.

A paper on Economic Materials for Boat and Barge Construction by A. E. Hageboeck, inspector in charge of creosoting operations, U. S. Engineer office, Rock Island, Ill., discussed the kinds of timber used for barge construction and the life to be secured from various kinds of material. A table of comparative costs showed that while the first cost of creosoted fir is somewhat higher than that for untreated timber, the annual cost per barge shows a considerable saving in favor of this material.

THE PRODUCTION OF THE WOODEN CROSS TIE.

A. R. Joyce read a paper on this subject of which the following is an abstract:

Statistics prepared by the Forestry Service of the United States show that of the 125,000,000 cross ties bought by the railways last year almost 80 per cent. were hewed ties. The sawed tie, while occasionally produced by mills built particularly for this purpose, is more generally a by-product of general lumber operations. The best board cuts are taken from the side of the logs, and the heart is boxed into ties and cut off to standard lengths. Small logs are also cut into ties when the value of the lumber they would make is not more than that of the ties the same stick would produce.

The greatest tie producing section in the United States is that portion of the country extending from Virginia to Missouri and Arkansas, south from the Ohio river to the Gulf of Mexico. In this territory the oak family predominates in the North and the pine family in the South. In addition to saw mill, logging and tie operations in this section, there are thousands of farmers producing millions of cross-ties annually. In seasons of the year when agricultural pursuits do not require attention they cut ties and logs, often putting in crews of men for the winter months. These men are paid by piece work, from 10 to 15 cents apiece for making a tie. An experienced cutter will make from 10 to 15 ties a day, and will produce a thousand ties in the four months from November to February.

From the point of making in the woods the ties are hauled by wagon to rail or water transportation; thus the tie producing territory is limited to strips of land lying on either side of railways or rivers, varying in width according to the condition of the wagon roads and the value of the tie at the point of sale. Ties are seldom hauled by wagon more than 25 miles, and this distance can be made only on good roads. The average haul probably eight to ten miles and the average load 12 to 15 ties.

The railway traversing timber lands buys ties for its own use along its right of way. Ties are piled in ranks or cribs a certain distance from the track convenient for loading and are inspected and branded by the railway tie inspector and spotted with paint before being loaded. The inspectors usually take up ties along the right of way once a month, or more often if the output warrants. In some territories tie dealers buy ties along the right of way, in which case their buyer counts, brands, spots and pays for the ties on the ground. When a sufficient quantity is purchased the tie company arranges for a special train and a railway inspector, and the ties are loaded out. Usually, however, tie companies buy ties only at sidings or stations, where cars can be spotted for loading.

Another method of handling ties is where the railway crosses or touches a stream. Ties are bought along the banks of streams at landings, the same as along railways at stations or sidings. Tie buyers make regular trips down stream in gasoline boats, stopping at all landings, getting out among the merchants, farmers, tie dealers, loggers and saw mills, urging or retarding the production of ties according to the requirements of their companies. They buy ties on the bank, paying cash, and inspecting, branding and spotting the ties with a certain color paint, which color the tie company records with the county recorder in the various countries through which the stream flows.

On navigable rivers the tie company contracts with a tow-boat company to barge the ties to the point of shipment by rail, where an incline track is laid into the water. The tow-boats take from three to six empty barges up stream and work down, rigging up chutes to the ties on the bank and loading the barges down as far as possible. Seven or eight thousand oak ties make a very good load for the average river barge, and such a tow of barges loaded in this way requires about seven feet of water to keep from grounding, so that towing on most rivers is possible only in certain seasons of the year. The barges are delivered at the loading point to a harbor boat, which spots them at the incline and does the work corresponding to that of a switch engine in a freight yard.

Inspectors for the railway inspect these ties as they are being transferred from barge to car, and the fact that they are working on a large number of ties results in a very economical inspection for the railway. Cull ties or rejects are yarded, as such a shipping point is very favorable for the sale of this material.

On streams that are not navigable ties are bought on the bank the same as on navigable water, but are held until conditions are favorable for rafting. They are then put into the water and made into rafts and floated down stream to a loading point. The usual method of loading from a raft to cars is by a tie hoist, which consists of a cradle lowered and raised on an incline track from the water to a loading platform. This kind of a tie hoist, operated by a gasoline engine, is efficient and can be installed at a reasonable cost. Where the bank of the stream is low the rafts are sometimes broken up and hauled out by horses, then loaded into cars by piece work or banked to be loaded into barges later. When the rafts are to be loaded into barges from the water a tie sweep is used, consisting of a stout pole used as a lever, with the fulcrum on the bank and the short end over the water. Chains grapple a section of raft which is lifted from the water, swung around over the barge and lowered into place.

Rafting is apt to be a hazardous proposition, as streams in rough or mountainous country often rise 40 to 50 ft. in 24 hours. It is practically impossible to hold rats under these conditions, so that many tie companies prefer to buy rafted ties only f. o. b. the tie hoist or bank after the rafting is completed. The element of danger from flood is also present in banking ties along navigable rivers, although not to such an extent as along head waters. The manager of river territory must be thoroughly conversant with all landings where his men are buying ties, as well as river conditions in general.

In managing railway territory, ties may be moved at any time of the year, the only hindrance being car shortages or strikes. But in river territory many landings are accessible for only one or two months in the year, so that in buying a large stock of ties under such conditions great care should be used in cleaning up such landings when conditions are favorable. Otherwise the stock must be carried over for another year. In fact, in operating any river territory all landings should be cleaned up at least once a year.

The cross tie being a staple commodity, the same as wheat, corn or cotton, country merchants buy ties, paying cash or giving merchandise credit in exchange. The merchant being on the job every day in the year has an advantage over a tie buyer, who is making that point only once or twice a month. This has led to the establishment of local yard men, paid either on a salary or commission basis. These men buy ties on the ground as they come off the wagons, inspect and pay cash for them. They in turn are checked up by the tie buyers. In many cases a local merchant acts as the company agent, and the tie company takes the inspection of the merchant, verifying his count and spotting the ties.

The tie business is strictly competitive, and while tie buyers could improve the grade of ties by having them cribbed before inspection, or, better still, by rolling them, this cannot always be done, especially when the demand for ties is sharp.

Ties are very seldom sold to a railway and shipped subject to inspection. The rule is for the railway company inspector to inspect all ties as they are loaded into cars from the ground. There are two exceptions to this, namely, when the ties are shipped into a concentrating point for transfer either by rail or water. If the ties are to be transferred to another car and shipped by rail, the railway company for whom the ties are destined, inspects at the point of transfer. If by boat on cargo shipments, this is also the case, but on river shipments by barge the ties are not inspected by the railway tie inspector until they reach their final loading point to be shipped by rail.

There are no standard specifications for treatment ties among railway companies. The red oak and pine families are, of course, the basis on which practically all treatment ties are figured, but

specifications beyond this are apt to differ widely. Elm, beech, hackberry, hickory, maple, birch, gum and other woods are taken by some roads, either all or in part, and not by others. Many of these woods make splendid ties when cut in the winter months and properly handled before treating, but if they are left in the woods or on the bank, ranked indifferently, many of them become worthless in from three to nine months. This applies particularly to river business, where ties can be moved only when the stage of water is favorable. Treatment ties that are properly cribbed for seasoning not only remain marketable, but the extra cost of cribbing is more than made up by the difference in freight.

At the present time along the banks of the Ohio river and tributaries are thousands of treatment ties that are absolutely worthless except as fuel wood, because they have been held too long under conditions favorable to the development of rot.

One railway company in getting out specifications for treatment ties this year, has limited its specifications to the red oak family exclusively because last year some 90,000 ties were split into fuel wood at the treatment plant on account of rot. A large number of these ties were beech. Although beech takes a splendid treatment and makes a serviceable tie, it would be a hard matter to get it into these specifications in the face of their recent experience.

It would be a splendid proposition if the railway companies and commercial treating plants would get together and put their experience in the handling and treating of ties in a common kettle and let it boil down to a standard set of specifications. Such a proceeding would not only insure a better tie for the railways, saving many of them a considerable item in dollars and cents, but would materially improve conditions among tie companies in the operation of their business.

DISCUSSION.

W. F. Goltra: Many roads are rejecting ties on account of rotting; this can be prevented. Some ties deteriorate more rapidly than others, due to the saps and juices fermenting and causing decomposition. The way to remedy this is to steam as soon as possible. If many ties which deteriorate rapidly are eliminated on that account the supply is decreased and the cost increased.

E. A. Sterling (Pennsylvania): Ordinary hewed ties are sold for but little over the cost of production. Sawed ties are put on the board-foot basis, making a heavy increase in price. Certain kinds of ties deteriorate rapidly in some localities and not in others. I do not see how any steaming or hot air blast seasoning can be applied to trees in the woods. In West Virginia it is often months before the ties reach the river and are rafted and delivered. Fermentation is not the fundamental cause of the decay of wood. It is the result of a fungus growth in which moisture assists.

D. Burkhalter (B. R. & P.): Beech can be seasoned for a long time in the North without deterioration.

J. B. Card: There is little decay if the ties are properly piled in seasoning. Piling is very important if the ties are to be held over a year.

A. R. Joyce: The ninety thousand ties referred to were piled solid along the railway tracks until loaded and were properly cared for after arrival at the treating plants.

J. H. Waterman (C. B. & Q.): Ties cut in winter will not deteriorate as rapidly as those cut in the spring and summer. Beech ties cut in the spring and piled tight, exposed to air, sun and rain, become worthless in six weeks. Beech cut in the winter and piled open will make good ties.

Mr. Goltra: There are two kinds of rot, dry rot and wet rot. Dry rot occurs on the inside due to fermentation. Decay starts very soon after manufacture.

Walter Buehler (Kettle River Co.): I do not believe there are two kinds of rot. We should know what rot is.

H. F. Weiss (Forest Products Laboratory): What rot is, is not definitely settled at the present time. Rot in the interior of wood has some external cause. It must originate from the exterior. There may be some deterioration due to fermentation,

but it is not serious. The fundamental cause is fungi, which are of many varieties. Some live on substances contained in wood cells. Tests show that the strength of wood sap stained by fungi is not affected. The most injurious effect is caused by wood destroying fungi. There is no such thing as dry rot. Some fungi are capable of living with a small amount of water; they are commonly called dry. This fungus has the ability to destroy wood fiber. The interior decay of a growing tree may be due to injury in young tree not noticeable later.

Mr. Card: Why do trackmen say black and red oak rots from the inside out?

Mr. Weiss: It may be due to the outer fibers being so dry that fungi cannot live.

Mr. Case: Hardened ties are very liable to interior decay.

L. B. Moses: I have found variations of 20 per cent. in rot in the same yard with the same kind of ties piled differently.

CUTTING AND SEASONING TIMBER.

A paper on this subject was read by A. Meyer, supervisor C. B. & Q. tie plant, Galesburg, Ill., of which the following is an abstract:

Owing to the scarcity of timber it has been found necessary to use inferior species of wood which heretofore have been considered as of little or no value for railway ties. Among those woods are the hard and soft maples, gum, sycamore, birch and beech. None of the above have, up to the present date, given very satisfactory results on account of their tendency to decay rapidly during the seasoning period, and only when a successful seasoning has been obtained are any of the above kinds of wood worth treating. There is no doubt that hard maple, and more especially beech, which possesses a great spike-holding power, will make very good ties when thoroughly seasoned and treated.

When beech ties are cut in the winter and are properly taken care of and are seasoned at least from six months to one year, a very good treatment can be obtained. If, however, the beech ties are made from timber cut in the spring or summer and piled up to season it is nearly impossible to keep the wood from decaying and splitting. The writer has seen beech ties which, when received at the treating plant, have been covered with fungi, and therefore absolutely worthless for treatment, although it was claimed by the shippers that these ties were cut during the months of February and March, when no sap was expected to be in the wood. An examination of some of these ties showed that the wood contained a considerable amount of sap.

In regard to the physical strength of wood cut in the different months, very interesting tests were made by the Economical Society, Westfalen, Germany, giving the following results: Beech timber cut in December and January gave an average mechanical life of six years, whereas the same kind of timber cut in the same location in February and March gave a service of only two years.

Four spruce trees, which were growing very close together in the same kind of soil, of the same age, and apparently alike, were cut one in each of the months of December, January, February and March. It was found that the wood in the tree cut in January possessed only 88 per cent. of the strength of the wood cut in December, the wood in the tree cut in February 80 per cent., and the wood in the tree cut in March 62 per cent.

DISCUSSION.

William A. Fisher (A. C. L.): Tests made on fresh cut heart pine ties, seasoned till the standard weight is obtained, requiring four months, showed the following results: Average sap wood, 12 to 15 per cent. Weight per cubic foot at start 49.5 lbs. Weight per cubic foot at end 45.12 lbs. Loss per cubic foot 4.38 lbs., or 8.86 per cent.

F. D. Beal: I have treated shasta sap pine, 50 to 75 per cent., with .246 lbs. zinc chloride per cubic foot, by the seasoned steam and vacuum process. It was cut in May and June, and was not piled before or after the treatment, and was placed in the track within a few months after cutting; it lasted only three years. I

believe if the same ties were cut in December or January and properly air seasoned before and after treatment their life would have been increased to ten years. The necessity of seasoning is not so great in heart timber. Douglas fir with the same treatment and the same seasoning, lasted eight to nine years; the rain-fall in the territory where the sap ties were laid was five or six inches per year. Heart ties lasted 20 years.

F. S. Pooler (C. M. & St. P.): It is not possible for a railway to compel a tie company to cut its timber in any one month, and it is also difficult for an inspector to detect the month in which the timber was cut. I believe it advisable for the company to mark each pile with the month of cutting.

Mr. Logan: In the southern country we have no difficulty in determining the time of cutting, but are unable to control the time for cutting because of labor conditions. One cannot get tie makers for a few months only.

G. W. Signor: It takes about a year to organize a crew. We handle about 3,000,000 ties a year, requiring a big organization. Smaller companies have the same problem. No tie maker will accept work for three months.

THE SCIENTIFIC MANAGEMENT OF TIMBER PRESERVING PLANTS.

D. Burkhalter, superintendent B. R. & P. wood preserving plant, presented a paper on this subject, of which the following is an abstract:

The best available labor for use in a timber preserving plant is a negro in the South, old-Mexico Mexican in the west, a Swede in the north, an Austrian in the east. On the Pacific coast, the Jap hardly reaches the size of a one-man tie carrier, even with a 130-lb. tie. Among them all, perhaps, the Jap absents himself from work least often and the negro the oftenest. The lowering of economic efficiency among the Latin races through too frequent holidays is well known. Such a difficulty seriously affects the operating organization. The carrying of an increased force at slightly higher rates is the usual result, the tendency to aggravation of the disorder by larger earnings in a day being counteracted by the lesser amount of work supplied each man on a piece-work basis. It is often possible to escape this dilemma by the establishment of a "side-issue" in the shape of a floating crew in a lumber yard or other material yard to take the overflow. It may happen that over-head charges, and depreciation, etc., are high enough to point towards a reduction in net cost per tie through the payment of wages high enough to ensure maximum output.

When more than one man is required to handle each piece, complications not heretofore mentioned become prominent. The diameter of the retort; the stamping of the ties; the kind of road-car; the height of the tie-pile; the number of piles in a row or tier, all affect the determination of the most efficient working unit or gang of men. A two-man crew will handle ties weighing 170 lbs., and a three-man crew 270 lbs. In putting ties on trams direct from road-cars, the distance from tram-track to road-car is to be considered, and also the design of tram-car arm. In a two-man crew, with one man inside the car and the other out, with ties weighing 175 lbs., there is the least waste of time or effort if the ties be shoved or hauled, with some support in the doorway or on side of car. This assumption that these conditions call for a two-man instead of a three-man crew, is borne out by the earnings per man being greater in the first case than in the second. Machinery may often be introduced at this juncture to reduce, or even do away with, the necessity, and corresponding expense of the effort. The loading of treated ties into open cars homeward bound is usually accomplished with a derrick, a tram-load at a time.

A heavy and irregular tie cannot be so accurately placed on a tram-car by one man as by two. But too much time wasted in getting the very last tie on the tram results in the same kind of a loss as overloading a locomotive on the road, i. e., the tonnage doesn't get moved. When one man of a three-man crew smashes a finger and gets shopped for repairs, the other two can continue working. The output per unit of space on the loading platform

is increased with every increase in the size of the crew. This reduces the time of making up trains, and affects favorably both switching movements and the supply of trams. A three-man crew works advantageously in unloading box cars into storage. In practice one man can throw out a tie which it takes two to carry away. And where piles are three tiers deep, i. e., track centers 72 ft. for an 8-ft. tie, ties may be so heavy or piles so high as to require all three men in carrying. With the usual remote location of tie-plant, and with heavy ties, the extra effort required to maintain the third tier will capitalize in terms of considerable trackage. Regarding the kind of road-car, it may be said that unloading a car with high sides is likely to require two men in the car, unless it be a ballast car which can be opened underneath; and if the tie be $8\frac{1}{2}$ ft. long, the loading of coal cars by hand with such ties needs an additional man in the car to place the ties lengthwise.

There are two more questions of yard layout that vitally affect any scheme of operation. One is an arrangement that will supply empty trams for reloading as fast as they are released, whenever the number of trams is limited; when the speed of working the crew is low; when the area to be worked is limited; or when the approach of darkness is imminent. It is hardly necessary to remark that often all of these difficulties arise simultaneously. The other point is the use of a parallel track instead of a third rail in lumber yards where cars may be expected to come in with forty sizes of lumber on each load to distribute along a 1,000-ft. frontage of different dimensions. Really busy tracks of that character would require a narrow gage track on each side.

The use of the large diameter retorts makes the cost of construction lower, and the output is affected advantageously in the same way that "heavy power" affects transportation on a railway. Everything else must be adjusted to correspond. The laborer works at a disadvantage proportional to the weight of the tie. The heat coils work at a disadvantage proportional to the reliance of the process on various thermodynamic effects; to the lack of absolute dryness of the timber; to the necessity for reduction of viscosity of preservative by heating, and to the lack of uniformity of absorptive capacity throughout the charge.

It should be said at this point that efficiency is increased by any betterment in the grade of labor. The payment of a bonus wage is an effort to effect such an improvement. Taking ties weighing 150 lbs., for example, and with a two-man crew, pay \$2.10 for the first 300 ties; 40 cts. for the next 50; 45 cts. for the next 50, and a cent a tie thereafter. This amounts to \$2.95 for 400 ties, or about 74 cts. a hundred; and 800 ties come to \$6.95, or about 87 cts. a hundred. With the low point adjusted so that the normal supply of poor labor cannot make their prevailing rate by a considerable amount, the able-bodied but lazy specimens among them will take occasional chances, the fair article will earn with some exertion a fair return, and the very rare expert a handsome stipend, which has its advertising value, and may equal seven times the wage of the worst.

The gradual accumulation of skilled workers in fine condition brings flexibility of operation corresponding to a lowering of the load on the management in the way of demand for nicety of execution of plans and general manoeuvres. Such a grade of men is likely to be more contented also. They will work at top speed for about seven hours only. By increasing slightly the number of workers, the resultant lowering of their wage promotes the availability of a sufficient number at irregular hours, and the capacity for making a rush in the morning or at the close of the day. In some climates the men are often more efficient at night, so that a lower rate can be paid to net them the same earnings per month.

In building a new plant, the proper time to begin to build the office is when the ground is broken for the plant. Complaint may be made that the use of the building and furniture by construction forces would have unhappy results. Some regulations would, of course, have to be enforced. But construction is often

hampered by lack of office facilities, and the advantage to the operator of systematic and permanent recording of every detail of construction is enormous. Too often a legacy of chaos is bestowed on the newly arrived operator. The timber may have been arriving for some time, in spite of the fact that improper location in the yard is pretty certain to result in constitutional weakness in operating efficiency that it may take years to eradicate. Catalogue numbers of fittings in the engine room are not known, and there are no spare fittings. If the plant is owned by a railway, their standard stock sizes have not been considered in construction, so that subsequent maintenance will have to look towards the gradual adoption of those standards. Gland packing and gaskets have usually got to be measured while things wait in idleness; and the breaking-in of the engineers and firemen is accompanied by a necessity for fertility of invention and a strain of one's presence of mind.

The quicker things get going the sooner dividends arrive. If, in the meantime, a clerk has learned the names of employees, and the stationery for a loose-leaf accounting system is on the shelves, control will come the sooner. For the control is in the office, and first-class recording and modern filing is the mother of it.

The treatment of timber is more uniform, if uniformity be considered a desideratum, in a retort holding only one carload than in a retort of twice the size. Compared with a large plant, the opportunity for closer control of treatment is an offset to high "overhead charges." The tax on timber supply and transportation facilities is more readily borne.

For effective control, nothing is better than a schedule to cover the next 48 hours, put out every day at about the same hour. Dictate to a stenographer the program of the runs to be made, showing the serial numbers for 48 hours, with the hour and minute due in and out of the retorts, the contents of each retort, and length of train. Write the engineers of any special features to be expected, and send carbon of both memorandums to both loading and unloading foremen. File copies in the office, and require interested parties to advise promptly if they see that predicted events are going to be unfulfilled, or early, or late. Furnish billing clerks with copies of instructions to loading foremen and switchmen, and in general make advices "join" to the extent that co-operation and co-ordination are assured. This interchange of notes is promoted by the use of compartment boxes in the office, with an extra desk for the use of all comers, and the requirement that periodical visitations, probably through the aid of water-boys, be made to it. When the time of treatment varies from three to thirty hours, there is room for much planning. The long pull should arrive at night, and the briefest events take place in the daytime, at the most favorable hour, and nearest the retorts. It is possible to make five trips in 24 hours with three sets of tram cars, and carry the load on a tie organization fairly steady. If it be admitted that the greatest irregularity in time of treatment indicates the greatest success in classifying material for treatment, conversely, by assuming that uniformity in time is a marked aid in all directions to ease off operation, there should be great room for the exercise of skill in putting together trains of refractory and easy stuff in a way to accomplish the purpose.

EFFICIENCY IN PLANT OPERATION.

A paper on this subject was presented by E. A. Sterling, Forester, Pennsylvania Railroad, of which the following is an abstract:

Modern business management demands a reduction in operating expenses in order to keep net profits from falling off on account of keener competition and the higher cost of labor and material. To meet this need, a comparatively new business system, known as scientific management, is being evolved and put into practice in many industries. As to how far the principle of scientific management can be applied to wood-preserving plants, further developments alone will disclose. It is certain that there are ample opportunities for increased efficiency at many plants. On the other hand, there is less opportunity to decrease operating

costs than in manufacturing plants, where labor constitutes a larger percentage of the cost of the product. At a creosoting plant which treats ties with, say 10 pounds of oil per cu. ft., at a cost of 35 cents, approximately 80 per cent. of the cost will be represented by the creosote, 5 per cent. by overhead charges, and 15 per cent. by labor; while in many purely manufacturing establishments labor may constitute more than 50 per cent. of the total cost. Obviously, the possibilities for cutting costs are not as great where labor represents 15 per cent. or 20 per cent. as where it amounts to 50 per cent. or more. Assuming that labor charges are practically the same, regardless of the process, it follows that the percentage value of the preservative used is less with the cheaper treatments using mixtures, mineral salts, or empty-cell injections, and the possible saving by increased efficiency becomes a higher percentage of the charge per tie. Moreover, the saving is not necessarily confined to labor, although this is the most fertile field, but should include economy of fuel, tools, preservatives and miscellaneous material.

In the application of a system which will insure greater efficiency in operation, the local conditions at each individual plant play a large part, and the man in charge must work out most of the problems for himself. There are, however, several fundamental conditions common to all plants which may form the basis for cost reductions all along the line.

In the yard there is the question of general arrangement as related to economic unloading and proper seasoning. The piling system should give maximum rapidity of seasoning, and the arrangement should be such that the unloading can be done without carrying the ties too far or too high. The chances are that most unloading gangs taught themselves and are paid on a day or piece-work basis for what they think is a fair day's work. Efficiency engineers would assert that the various motions necessary to pick up ties and carry them to the piles should be systematized, and that each man should be carefully instructed by a superior in intellect as well as rank as to just what moves to make, how to make them, when to rest, etc. This seems ridiculous at first thought, but the fact remains that wonderful showings in efficiency have been made by such detailed methods. In some cases carefully thought out mechanical devices may be the means of reducing costs in tie handling. What would apply to unloading and piling ties would hold in loading cylinder cars and on the shipping platform.

In changing charges and in the mechanical operations during treatment, little manual labor is involved, and efficiency becomes a matter of saving time, fuel and preservatives. In the one operation of opening and closing the cylinder door, much time can be saved, and it is common knowledge that men properly directed will do the work much quicker and easier than by their own method. In the engine house the speed of the pumps is an important factor, and their proper regulation will have a marked influence on steam consumption, time and character of treatment, and cost of maintenance. The firing of the boilers, the operation of the valves, and the many other every-day operations will bear close study with the view of steam economy, better penetration and saving of time.

Proper plant equipment is essential to efficient operation; while facilities for prompt and careful repairs of tools and machinery will reduce maintenance charges. Large pipes for filling and emptying the cylinder, ample steam capacity of the boilers, and oversized rather than small pumps will increase the output and reduce costs. Cylinder cars are an important part of the equipment, yet, at many plants, small, hard-running cars without coupling attachments are still used. It is economy to scrap worn-out or antiquated equipment and replace it with new.

DISCUSSION.

Mr. Sterling: Conditions at different plants vary so greatly that no one is able to say what should be done at any particular plant. Each superintendent must apply fundamental efficiency principles in his own plant to suit his own needs.

A. Gibson (N. P.): Plants which use the same kind of treatment for long periods can do much better than others, having to

change their kind of treatment frequently. A very important factor in efficiency is securing proper co-operation of the employees for the benefit of the company rather than for the individual department. Piece work should be applied wherever possible, as employees know increased efforts mean increased earnings.

Mr. Waterman: The efficiency of a plant is measured by the percentage of time the retorts are busy. The first place to look for efficiency is in the speedy charging of the retorts. The most efficient work in the yard is secured by piece work. I would have good shower baths at the plant where men handling treated ties can take baths throughout the year. Take care of the men and you will secure co-operation and efficiency.

Mr. Angier: I have mimeographed delay reports showing the retort number, the delay and the cause. I figure that each retort should be busy 24 hours. If a retort is delayed two hours, the report shows the cause. At the end of the month we tabulate the hours of delay and the different causes, and then endeavor to apply the remedy. The first report showed several hundred hours delay on account of lack of tram cars. This report persuaded the management to purchase more cars. Allow 20 minutes for changing the retorts. All over 20 minutes should be called delay.

Mr. Sterling: I do not see the way clear yet to issue instruction cards for the operation of a treating plant 48 hours in advance, because of the many uncertainties of operation, however, much could be secured by working toward this end.

On Wednesday morning a paper was read by S. R. Church, chemist, Barrett Manufacturing Company, giving a summary of the various specifications and outlining the difficulty of complying with the American Railway Engineering Association's specifications. This paper will be published in a later issue. A paper was also read on Wednesday morning by P. E. Fredenoll, chemist, Atchison, Topeka & Santa Fe, on the Evaporation of Creosote, in which evaporation tests of ties in yards and oils in open pans, showing the relative evaporation of different grades of oils, were outlined. This paper will be published in a later issue. B. H. M. Rollings also read a paper on the Comparison of Expansive Properties of Creosoted Wooden Blocks, giving results of preliminary tests on this subject.

The paper by H. F. Weiss, Forest Products Laboratory, illustrated with stereoptican views, discussed the structure of commercial woods. In considering the treatment with preservatives, woods can be classified under three heads, ring porous, uniformly porous, and non-porous. The treatment of woods in the first class, such as red oak fills large pores in spring wood and does not penetrate to the interior. In the second class such as beech, oil may penetrate uniformly or in streaks. In the third class such as conifers, including pines, hemlock, cedars, spruce and fir, which are uniform in structure and dry rapidly, the treatment varies.

Resin ducts in non-porous woods may facilitate treatment as in southern pine. Some porous woods, such as white oak, have partitions across the cells making the treatment difficult but increasing the durability on account of the difficulty of fungus gaining entrance. Air seasoned timber contains about 69 per cent. of air. Tests show that this air does not leave the wood on treatment. It is not compressed in the middle of the stick. It may be compressed in each cell or in the pockets throughout the stick.

Tests show that if vacuum is applied before treatment, removing some air, the oil injected stays in the wood better. A large percentage of sap wood in ties is usually considered preferable. If sap wood surrounds the heart, the treatment covers the wearing faces of ties to a good depth.

In hewed pole ties there is a thick layer of sap wood on all sides of the heart and the wood is exposed on both faces. It takes high absorption in treatment, but is not benefitted much, for very little penetration is secured on the wearing faces.

In sawed ties little sap wood is left on the sides. The treatment is light but effective for the penetration is deeper and more uni-

form on the face. If the railways would allow sawed ties, the additional cost of three or four cents each for production would be more than saved by the decreased absorption in the treatment and the increased effectiveness of such treatment.

Use of sawed ties would also help conserve the timber resources of the country. Ties should be carefully peeled before seasoning, for the bark is waterproof and causes uneven drying, making uneven penetration in the treatment.

Tests to determine the relative penetration in different directions within the sticks, show for woods having resin ducts-like pines, for 1 in. tangentially, 30 in. radially and 50 in. longitudinally; for woods like hemlock, 1 in. tangentially, 1 in. radially and 80 in. to 100 in. longitudinally.

CREOSOTES AND CREOSOTING OILS.

David Allerton presented a paper on this subject of which the following is an abstract:

Creosote seems to have been originally adopted in England as the synonym for dead oil of coal tar, and the product was first called dead oil because its specific gravity was greater than water. When it was found necessary to define creosote by a certain specification, not much being known about it at the time, except that it contained tar acids and naphthaline, a specified amount of these constituents was required as well as a specific gravity greater than water. Afterwards, as more chemical work was done in coal tar derivatives, a process of analysis by fractional distillation was devised, the original object being to determine that the creosote had been obtained from crude bituminous coal tar. Also a specific gravity greater than water, at least 1.02 and upward was required, this fractionation was so graded as to eliminate the very light oils and water and leave only an inconsiderable residue at the end of the process. At first the distillation was not usually carried above 310 or 315 deg. F., but afterward as high as 354 deg., when only a very small amount was allowed to remain in the retort. The method of distillation was also standardized, and that method still obtains, the oil complying with certain requirements in a general way. There seems to be no doubt that all pure tar creosotes are good wood preservatives, even if they vary to some extent. It is evident that the less the viscosity of a liquid, either an oil or an aqueous solution, the easier it is forced into wood fiber, and that in treating refractory wood it is desirable to have a preservative of a very low viscosity. It is impossible to get an exactly even penetration in any charge of timber or ties, and the greater the viscosity the greater the variance.

In quite recent years so-called standard specifications have been adopted by different associations defining the properties of creosote to be used in the treatment of ties and timber, as well as paving blocks. These specifications, usually require very high specific gravity and distillation points calling for an addition of coal tar or pitch (it seems to be known by both terms), but viscosity is lost sight of, although but a limited amount of insoluble matter or carbon is permitted, it being assumed that no matter how thick and heavy the liquid is it can be made to penetrate wood if it contains no insoluble matter. This is fallacious. At first it was not definitely stated what the creosote was to contain, the required analysis only being given and allowing a large, and, in the paving mixture, a very large residue above 354 deg., merely stipulating that this residue should be soft. With American creosote it is always hard, but that does not seem to matter. These mixtures are not what was originally meant by the term creosote, and I think that they should have been defined as to what they should contain besides the dead oil. The inventors of these heavy mixtures considered them a great improvement on the lighter preservatives, and they were governed by purely altruistic motives.

The cause for the excessive oozing of the oil, commonly called bleeding, from paving blocks can be traced very simply to the use of such oils, as when they are treated with creosote this bleeding is very slight and increases with the weight of the oil.

Using crude coke oven tar as a basis, which contains some-

where about 30 per cent. of creosote, this material contains all the preservative necessary, as 30 or 40 per cent. of creosote is amply sufficient in any preservative mixture where a neutral body is used.

Coal tar is inert matter as regards preservative qualities and is used in creosoting for precisely the same purpose as barytes are used in paints, its fault being, as I have before stated, its high viscosity; but at present there seems to be no substitute on the market, and there is in some quarters a return to creosote as formerly used by those who have tried the heavy mixture. However, the combined creosote and tar will undoubtedly still be used, and the purpose of this paper is to suggest a correct appellation of the various creosoting mixtures and creosotes.

I propose the dead oil of coal tar be designated as creosote; other creosotes, such as wood creosotes, oil tar creosote, etc., be so designated, and the mixture of creosote with coke oven tar, filtered tar, oil tar, etc., be designated creosoting oils, and the specifications for such oils to call for the per cent. of creosote contained and the per cent. and kind of matter added.

There was no discussion.

CREOSOTE SPECIFICATIONS AND ANALYSIS.

Hermann von Schrenk's paper on this subject, of which the following is an abstract, was read by the secretary:

Creosote should fulfill two, and possibly three, requirements. First, it should be antiseptic, i. e., prevent the growth of wood-destroying organisms; second, it should be of such composition that it will remain in the wood as long as possible, i. e., it must not evaporate. To these a third claim or requirement has recently been added, particularly in connection with the wood-paving industry, that it must act more or less as a waterproofing material.

While creosote, more properly called coal tar creosote, is called a substance or compound, it cannot be considered as a definite compound. It is simply a fraction or distillate obtained from coal tar, composed of a large number of chemical compounds or substances, which are more or less loosely united. These substances probably do not exist as such in the combination called creosote, but can be isolated either by applying heat or subjecting the creosote to chemical decomposition. When speaking of creosote, therefore, one must remember that it differs in this respect from zinc chloride, copper sulphate, lime or any of the other substances used in wood preservation.

The first requirement of creosote is that it must be antiseptic. It was found many years ago that ordinary coal tar prevented decay, and later on that its derivative did the same. The question early arose as to what parts of the creosote were most effective in preventing decay. Practically all students of creosote oil agree that both the tar acids and naphthalene are good antiseptics. No two investigators have been able to agree, however, as to the relative values of certain percentages of either of these compounds in a creosote oil. It seems to make very little difference whether the tar acids compose 3 per cent. or 10 per cent. of the oil, and the same is true of the naphthalenes. I have no hesitation in saying that probably all parts of creosote oil are sufficiently antiseptic to prevent decay, i. e., for practical purposes. Pieces of wood treated with naphthalene, low boiling tar acids, high boiling tar acids, coal tar, etc., have been in our rotting pit for years, and where the preservative injected is still present in large quantities, the wood is sound. The minute the preservative disappears, decay sets in. This is particularly instructive in the case of naphthalene. The pieces were injected with all the naphthalene they would hold. For three years they remained solid. Now much of the naphthalene has disappeared and the pieces show it. A good many results have also been obtained from pieces of creosoted wood of different ages and exposures. All of these pieces were sound. In the oldest pieces only the highest boiling compounds were present, and these pieces are sound; in others, where much naphthalene was originally used, and where it was prevented from escaping, as in piles under water, the wood is sound.

The second requirement of creosote is that it must be more or less permanent. Investigations of recent years have shown that all creosote oils after injection into wood change in composition. These changes are due largely to the fact that some of the compounds evaporate. The extent of such evaporation will depend on the original composition of the oil injected, its distribution in the wood, the climatic conditions under which the wood is exposed, and the position of the exposure, i. e., under water, above ground, below the soil, exposure to sun, rain, etc. In a paper published several years ago my associates and myself showed by comparative tests of the same oils exposed in open pans and injected into wood, that the lower boiling fractions of the creosote evaporate with the greatest rapidity, and as the fractions increase in specific gravity, and as their boiling points rise, the rate of evaporation decreases, reaching an approximate permanence in the pitch. We furthermore were able to demonstrate that the results obtained in these experiments were borne out by the changes in creosote injected into poles. Since our first publication these tests have been repeated, particularly abroad. In Germany the same results have led the users of creosote to demand heavier oils. The same is true in other European countries. An investigation was reported last year by the British Post Office Department, a part of which may be referred to here: It was found in one pole "that the creosote at the top of the pole was only one-seventh of the amount originally present, and that it was only slightly greater in the middle of the pole; whereas at the ground line the quantity was one-third of that originally present." An examination of the creosote contained in this particular pole, which was one of the older ones in the line, showed that nothing distilled below 320 deg. C. The author states, "It is evident, therefore, that the phenol, cresol and other phenoloids and also the naphthalene had disappeared, but the basic substances, such as acridine, were still present." He concludes: "It would seem, therefore, that the opinion put forward by Mr. Boulton is justified (Mr. Boulton urged the heavy constituents of creosote oil), and that the heavier portions of the creosote are the most durable and effective."

The differences with respect to the evaporation are very marked. The higher per cent. of low boiling fractions, the greater the per cent. of evaporation. I give herewith the evaporation from a pan of three European oils, together with the composition of each:

	No. 836.	No. 1535.	No. 1521.
Sp. Gr.	1.062	1.045	1.022
210 deg. C.	4.0	1.9	5.6
235 deg. C.	16.0	33.8	26.5
270 deg. C.	21.4	20.8	22.6
315 deg. C.	20.2	16.5	17.1
355 deg. C.	23.6	19.5	17.1
Residue	14.5	7.5	10.7
Residue	1,206	0.0 per cent.	

The differences are certainly striking. It will be noted that the oil having the highest specific gravity shows the least loss, while the one with the lowest specific gravity shows the highest loss. Oil No. 1521 had a very high percentage of tar acids. In this connection it is interesting to note the following table showing losses of individual fractions of a creosote oil:

	Sp. Gr.	Loss after 14 mos.
210 deg. C.—235 deg. C. fractions.....	1.008	90.4 per cent.
235 deg. C.—270 deg. C. fractions.....	1.022	71.9 per cent.
270 deg. C.—315 deg. C. fractions.....	1.053	26.5 per cent.
315 deg. C.—355 deg. C. fractions.....	1.059	4.0 per cent.

The rate of evaporation from creosoted wood has assumed particular importance in recent years, because of the general use of processes using small quantities of oil distributed through a stick. With a full cell treatment, while a loss by evaporation is not desirable, it is not as serious as it is with a treatment using a very much smaller quantity of oil. Where oils are used having high percentages of low boiling compounds, a large amount will disappear in a year. An oil with 35 per cent. to 45 per cent. distilling up to 235 deg. C. (M. of W. method), will not stay in the wood as long as one in which only 12 per cent. or 15 per cent. distill up to 235 deg. C. The general realization of the loss by evaporation is causing a general demand for heavier oils, or

where such oils are not obtainable, for the injection of larger quantities of the poorer oils.

Although all parts of coal tar are antiseptic, and therefore acceptable, it appears, when their stability is considered, that many of them should be ruled out. In view of the different composition of creosote oils obtained from different coals, and in view of the general value of all compounds from an antiseptic standpoint, furthermore in view of the rapid disappearance of the low boiling fractions (meaning thereby those distilling below 235 deg. C.), what more can be said for a good creosote oil than that it must be a coal tar product and have as small a percentage of low boiling compounds as possible?

I have frequently warned against too great refinements in a specification. There are many kinds of creosote oil whose actual composition is beyond control, because that depends on the coal. The distiller can control the various fractions to a certain extent, and depending on the demand for naphthalene, anthracene, hard or soft pitch, he will vary the composition of the oil. Beyond that, however, there is little to be done. If he has a pure coal tar product, a small part of which consists of low boiling compounds, he makes a good creosote oil. That is the view of the Europeans, and their specifications are extraordinarily simple. Their requirements are brief, and the demand for small percentages of low boiling fractions is universal. Another fact in this connection is that in most countries lengths of life of 25 to 30 years are obtained from creosoted ties, irrespective of the specification, showing, to my mind, that discussion as to individual fractions, except as they pertain to permanence, are more or less absurd. Our Maintenance of Way specification attempts to do the same. I was told by railway officers in several European countries this winter that it met their ideas more completely than any of their own. It calls for a high grade oil, such as will fulfill the requirements, indicated by past experience. This specification has been severely criticized, because it is stated that very little oil can be purchased in this country which will fill that specification. This is not entirely true, but if it were, is that any reason for making a poorer specification? We get millions of gallons of creosote every year which does fill that specification. That there is oil available, which does not do so, is no reason for abandoning the standard. Such oil can be used, in larger quantities, and allowances can be made for the extent to which it falls below the standard. In view of perfectly uncontrovertable facts as to the rate with which the poorer oils leave creosoted timber, particularly where economical processes are concerned, a high standard is the only safe course. My claim is that the heavier the oil the more certainty there will be that long life will be obtained.

Reference has been made to a third requirement of creosote oil, namely, water-proofing qualities. Specifications have been written calling for "creosote oil" of a specific gravity, in many instances as high as 1.10 or more. Any one familiar with coal tar creosote realizes that such a requirement is impossible, because there is no coal tar creosote in any quantity having such a high gravity. The heaviest oils known rarely exceed 1.082. To make an "oil" with a specific gravity of 1.10 or more means that coal tar pitch has to be added in considerable quantities to creosote, and this is what is being done. Creosote will waterproof wood to a certain extent; the extent being largely determined by the quantity injected. A piece of wood with 5 lbs. of creosote per cubic foot will absorb very much more water than one with 15 lbs. per cubic foot. The heaviest injections, however, will not entirely waterproof wood fiber. A good heavy creosote will answer every purpose.

A creosote analysis consists essentially of two parts: a chemical determination for the purpose of detecting adulterants, such as petroleum, water-gas, creosote, or tar, etc., and, what I call, a physical determination or fractionation, to determine the relative amounts of low and high boiling quantities. The first analysis is the business of the chemist, and should not be attempted by anyone but a trained chemist.

The fractionation has for its object the determination of the per cents. of low and high boiling fractions. It is not a chemical method in the exact sense of that term. The present Maintenance of Way method was most widely used, hence its adoption. It is being criticized because varying results are obtained by various operators. This will also happen with other methods. A slight technical advantage should not be allowed to overshadow the serious results which might result with an entire revolution in our methods of stating fractions.

YARD ARRANGEMENTS AT TREATING PLANTS.

J. H. Waterman gave an informal talk on this subject, illustrating his remarks by blue prints. An abstract of this talk will appear in a later issue.

TREATING SEASONED VS. UNSEASONED TIES.

F. J. Angier, superintendent timber preservation, B. & O., read a paper on this subject, an abstract of which follows:

The writer made the following report on treating seasoned vs. unseasoned ties, while in charge of a timber treating plant in Illinois.

The first question is, What is a seasoned tie? By an unseasoned tie, is meant one freshly cut, or, at least, one that has been recently cut and has lost but a very small amount of the moisture which it originally contained. A seasoned tie, therefore, is one that has been cut for some time and the moisture allowed to evaporate to a greater or less degree.

The time necessary to season a tie so that it can be properly treated varies in different localities, as well as in different seasons. The kind of wood also is of considerable importance. Oak ties, in Illinois, must be air-seasoned six months or more, according to the time of year, before they can be properly treated. Some kinds of ties may be seasoned in three or four months.

For the purpose of illustration, and as a basis for argument, assume that it requires six hours to treat a charge of thoroughly seasoned ties, and nine hours to treat a charge of unseasoned ties. This has been found to be a fair average. It should be stated here that the treatment referred to is with a mixture of creosote and zinc-chloride, known as the Card process.

The two following tables show the cost of treating in a plant having a maximum capacity of 1,800,000 seasoned ties a year, and the cost of treating in the same plant, where the maximum capacity is reduced to 1,200,000 unseasoned ties a year.

SEASONED TIES.

Capacity of Plant, 1,800,000 per Year.

Unloading from cars to ground to season at \$0.007 each.....	\$12,600
Loading from ground to trams at \$0.0055 each.....	9,900
Switching trams at \$0.002 per tie.....	3,600
Loading treated ties out at \$0.0065 each.....	11,700
Fixed expenses.....	23,268
Preservatives at 15c. per tie.....	270,000
Fuel (assume $\frac{1}{2}$ less for seasoned over unseasoned ties).....	5,600
Insurance carried on 1,000,000 ties (estimated).....	4,000
Interest on 1,000,000 ties for six months, or 5 per cent. on \$250,000.....	12,500
	<hr/>
600,000 more seasoned ties treated than unseasoned, worth \$0.044 each (see statement).....	\$353,168
	<hr/>
	\$26,400
	<hr/>
\$0.1815 per tie.	\$326,768

UNSEASONED TIES.

Capacity of Plant, 1,200,000 per Year.

Unloading one-fourth from cars to ground to enable prompt releasing of cars, at \$0.007.....	\$2,100
Loading 900,000 ties from cars to trams at platform and 300,000 ties from ground to trams at \$0.0055.....	6,600
Switching 300,000 ties from yard to retorts at \$0.002.....	600
Loading treated ties out at \$0.0065 each.....	7,800
Fixed expenses.....	23,268
Preservatives at 15c. per tie.....	180,000
Fuel.....	8,400
Insurance carried on 300,000 ties (estimated).....	1,200
Interest on 300,000 ties, or 5 per cent. on \$75,000.....	3,750
	<hr/>
\$0.1948 per tie.	\$233,718

In each case the total cost of handling is shown from the moment the ties are received at the plant until they are loaded into cars for shipment. In the case of fixed expenses there are included the salaries of the superintendent, general foreman, office

force, engineers, firemen, etc., that is, all labor which would not change one way or the other, whether treating seasoned or unseasoned ties. This amounts to \$0.0129 per tie when treating 1,800,000 ties per year, and \$0.0194 when treating 1,200,000 ties per year.

In the case of seasoned ties, where no steaming is done, it is assumed that insurance is carried on 1,000,000 ties for six months and that \$250,000 will be continually invested at 5 per cent. In the case of unseasoned ties, we must assume that at least 300,000 will always be in the yard. This stock is necessary to provide against delay to plant at certain times of the year, when traffic is so great that company material cannot be moved with regularity. Also, at certain times of the year, ties will be received faster than they can be treated, necessitating the storing of a portion of them.

It is shown in the following table that a treated tie is worth \$0.044 to the company.

UNTREATED TIES.

First cost	\$0.50
Cost of putting in track.....	.15
Cost of tie in track.....	\$0.65
5 per cent. interest on investment for six years.....	.195
Second renewal, end of six years.....	.65
5 per cent. interest on first investment for six years, and on second investment for six years.....	.39
Total cost of tie for period of 12 years.....	\$1.885
Average cost per tie per year.....	\$0.157

TREATED TIES.

First cost	\$0.70
Cost of putting in track.....	.15
Cost of tie in track.....	\$0.85
5 per cent. on investment for 12 years.....	.51
Total cost of tie for 12 years.....	\$1.36
Average cost per tie per year.....	\$0.113

Saving per tie per year, \$0.044.

Untreated ties are assumed to last six years, and treated ties twelve years.

Assuming this to be reasonable, and that 600,000 more ties per year can be treated when thoroughly seasoned, the value of 600,000 ties, at \$0.044 each is deducted from the cost of seasoned ties. This shows a difference of \$0.0133 per tie in favor of treating seasoned ties. This multiplied by 1,800,000, the number of seasoned ties treated per year, represents a saving of \$23,940 in favor of seasoned ties.

In addition there would be a better penetration of the preservatives; therefore a longer life obtained for the ties and the lessened possibility of injury to the wood by steaming. When steaming there is always a large amount of sewage to dispose of, while in non-steaming there is practically none. The disposition of sewage is a difficult problem at most plants, because no matter how it is handled some of it will get into the rivers or creeks and pollute the water to such an extent that damage suits may result. This is entirely avoided when using seasoned ties.

Discussion of this and the following paper will be printed in a later issue.

INSPECTORS AND INSPECTION OF MATERIAL AND TREATMENTS AT COMMERCIAL PLANTS.

R. L. Allardyce, of Texarkana, Texas, read a paper on this subject of which the following is an abstract:

I am aware that only the commercial plants have this problem to contend with. The tendency is growing for the purchasers to have their representatives at the plant to inspect both the raw material and the treatment, and where the inspector is competent it is really a benefit to the plant, as it acts as a check on their work.

The raw material should be inspected at the saw mill or tie and piling camps, as inspection of material at the plant works a hardship. While the treating companies may have their own inspectors taking up the material, no two inspectors will take the same view of a piece of timber, and especially is this so in piling; one may consider a small defect of no consequence and accept it to have it thrown out by the purchaser's inspector, who might take one that had some other defect in it.

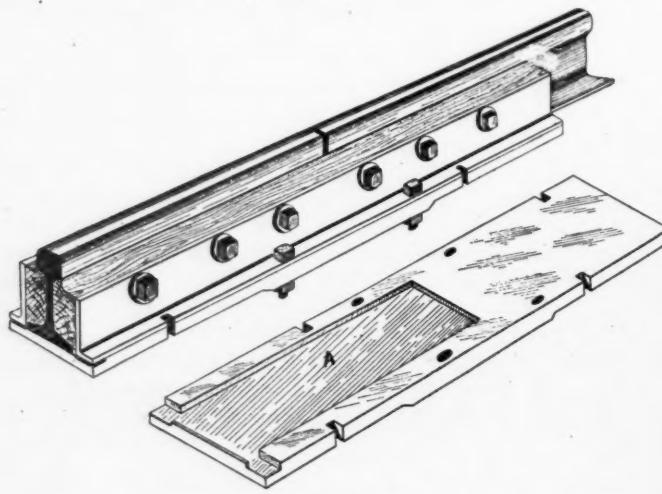
If the material is shipped in subject to inspection at the plant the culs have to be contended with, as well as controversy with the shippers. I have found that taking care of the rejects will entail as much, if not more, expense than handling the same amount of material through the retorts. They must be kept separate; each piece must be marked with the number of the car from which it came and must be stacked away properly. When the shipper comes along it must be handled again for him, to show him the defects. This expense is generally left for the plants to bear. Also, if a cul or reject is found in the last car of the order, it is necessary to hold up the order until the pieces can be replaced from some other car coming in to the plant. We have a small saw mill at our Texarkana plant to try and take care of the culs, but on large timbers we generally have to hold up the order until we can replace them as above.

I am of the opinion, when an order is of any size or consequence, the plants should request an inspector at the origin of the material, as well as an inspector of treatments at the plants.

At the annual banquet on Wednesday night there were about 65 present.

INSULATED RAIL JOINT.

The demand for insulated rail joints has rapidly grown with the great increase in the number of automatic signals placed in service. The accompanying illustration shows one type of joint which has been in use for several years on a number of roads. It consists essentially of a forged steel base plate on which the rail rests, two wooden filler blocks and two angle irons, with the necessary bolts. The forged steel base plate is $1\frac{1}{8}$ in. thick through its center portion and weighs about 75 lbs. The metal driven out in making the depression at *A* is forced into the center of the plate and a slab of white oak, 7-16-in. thick, is forced into the recess. As this slab is wider than the base of the rail resting on it and extends beyond the center of the joint it af-



Insulated Rail Joint.

forbs insulation for one rail base. White oak filler blocks are placed in the fishing space of both rails and are held in place by two angle bars weighing about 30 lbs. The horizontal bolts passing through the web of the rail are insulated in the angle irons at both ends and holds the blocks and rails in position. These angle bars are held to the forged base plates by four vertical bolts. The only fibre insulation necessary is for the bushings and washers on the horizontal bolts and two fibre end posts. With this joint the use of spikes is not recommended as internal stresses are generated by the running of the rail which tend to wear the bolt insulation.

It is said that in five years the renewals of some 2,000 joints of this type has not exceeded 20 per cent., and that in this case the white oak has proven superior to the fiber when it is encased and pounded. An examination of a few joints having been

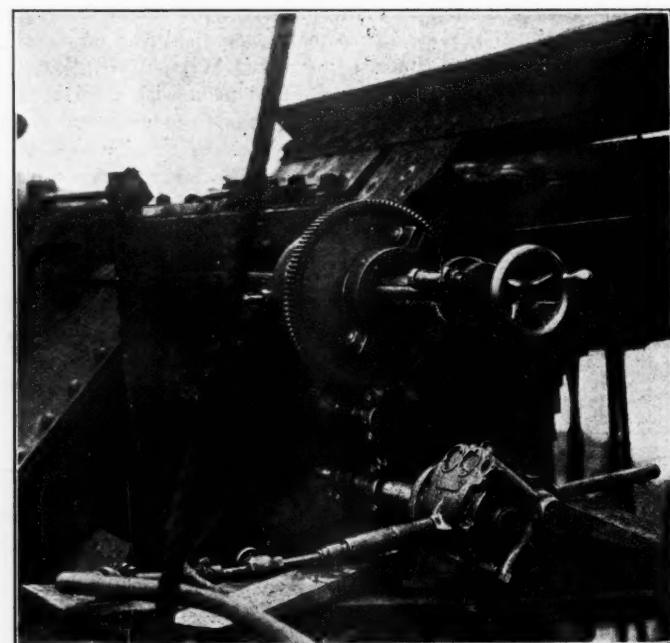
in service for 2 years showed that the oak was in a fine state of preservation and had become somewhat harder due to compression, while the maximum life with fibre slabs under the same conditions was found to be six months. So far it has been found immaterial whether the wood base is located under the receiving or departing rails. Twelve joints of this type were installed experimentally on the Philadelphia & Reading on March 15, 1901, and were taken out of the track on May 5, 1908, without any repairs having been made, an average of about 250 trains daily passing over these joints. On October 15, 1897, some of these joints were put in track at the Reading Terminal and remained there until December 2, 1908. During this time new wooden filler blocks and base plates were installed every three years. An average of 600 trains and engines passed over these joints each day.

Among other roads this joint is now in use on the Pittsburgh, Cincinnati, Chicago & St. Louis; Chicago, Milwaukee & St. Paul; Philadelphia & Reading; Pennsylvania; Michigan Central and Lehigh Valley. It is made by the Q & C Company, of New York.

A NOVEL METHOD OF RENEWING THE PINS IN A TRUSS BRIDGE.

A very interesting method of renewing the pins in a pin-connected through Pratt truss was recently worked out on a bridge of the Chicago, Milwaukee & St. Paul crossing the north branch of the Chicago river in Chicago. This is a swing bridge 230 ft. long with unequal arms and rests on a pier on the north bank, with its long arm extending across the river. It was built in 1902 and the pins and borings had become worn.

The common method of handling such work by driving piling and erecting false work to support the track while the different members were taken to the shop and rebored was not advisable.

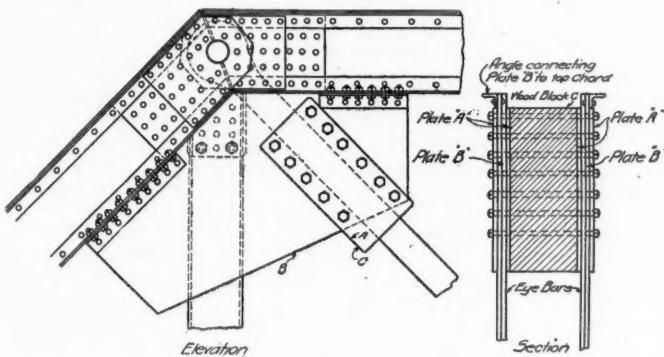


Boring Machine in Position for Reborning Pin Holes.

Even under the most favorable circumstances this method would have stopped navigation for several days and difficulty would have been met in getting permission from the government to block the channel for this length of time. To avoid this the following novel method was devised and followed: Before removing each pin it was necessary to fasten the eye bars centering at the joint to the upper chord members. To do this two steel plates marked *A* in Fig. 1 were placed on each side of each eye bar, with a block of wood, *C*, fitting between the inner two plates. The two outer plates reinforced plates *B*, which were

directly in contact with the eye bars. The entire connection was bolted tightly together with 1-in. bolts, thus developing enough friction between the plates to take care of the dead load stress in the eye bars. The two plates, *B*, one on each side, were fastened to the lower flange of the top chord and to each end post by angles and bolts, as shown in the drawings. In this way when the pins were driven out all members were rigidly held in position.

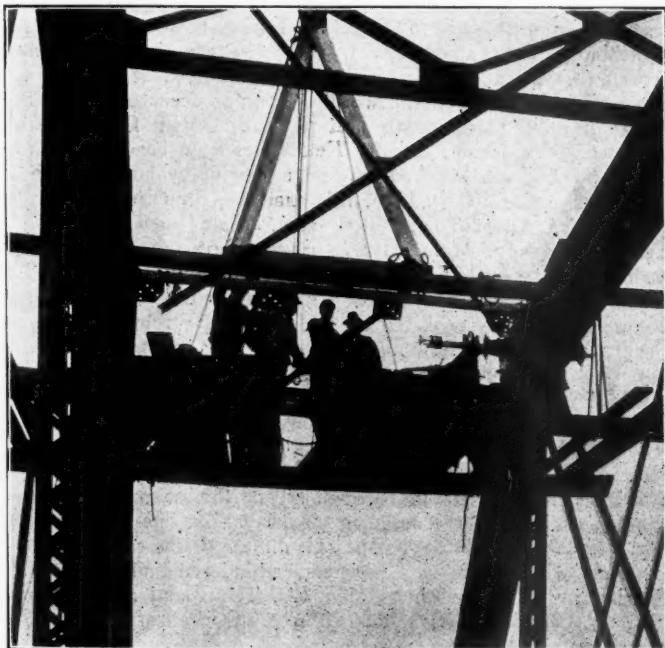
When the pins were removed they were found to be consider-



Method of Renewing Pins in C. M. & St. P. Bridge at Chicago.

ably worn and their bearings somewhat enlarged. The holes were rebored from the original 5-in. diameter to 5½ in. by means of a portable boring bar, made by J. T. Ryerson & Co., Chicago, which, although designed primarily for boring locomotive cylinders in the shop, gave excellent satisfaction under these adverse circumstances.

The accompanying views show this apparatus in position for reboring the holes and the bracing necessary to support the



Arrangement of Apparatus for Reborning Pin Holes in Truss Bridge.

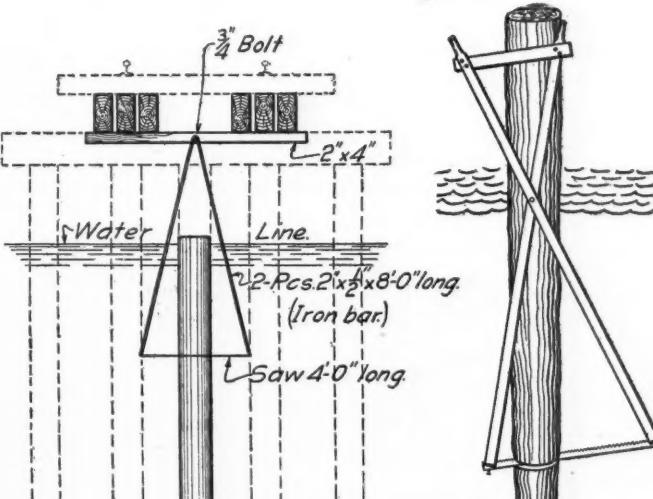
machine in this position. The power was furnished from a section car provided with a gasoline engine and an air compressor. The boring bar was directly driven by a small air drill which operated the shaft and furnished the required power.

The work was started at 6 o'clock on the morning of November 6, and by 8:15 p. m. of the same day the four pins had been removed, the holes rebored and new pins inserted, and traffic was passing over the bridge.

SAWING PILING UNDER WATER.

It often becomes necessary to saw piling off under water following the use of falsework or the driving of new bents in the reconstruction of a bridge. The following methods have been used for this purpose for a number of years in different parts of the country, but conversations with a number of bridge men recently has disclosed the fact that many are not familiar with them and resort to less satisfactory expedients. They are worth describing therefore.

A simple method was used recently at Madison, Wis., where it was necessary to remove a large number of piles at the Chicago & North Western crossing of Lake Monona. The apparatus shown in the sketch was made up of two pieces of 2 in. x ½ in. strap iron 8 ft. long, fastened at the upper end to a 2 in. x 4 in. timber 6 ft. long, which was, in turn, fastened to the bridge stringers. The saw extended between the lower ends of these iron pieces. By rotating the frame through a small arc with the saw bearing against the pile it was sawed off, the men working from a raft. In this instance two men sawed off from eight to



Two Methods of Sawing Off Piling Under Water.

ten piles per day with the device and better progress could have been made had the lake not been rough, interfering with the work to some extent.

Another rigging quite similar to this consists of two 2 in. x 4 in. timbers fastened in the manner shown in the second sketch. These timbers are held apart at the upper end by a third timber and the saw is fastened at the lower end of the timbers. It is operated in the same manner as the one previously described. Very frequently piling will saw easier in this way under water than out of it, for the water removes the sawdust so that it does not clog the opening.

Another method occasionally used is to cut off piling with dynamite. A hole is bored down the center of the pile with a ship augur and a stick of dynamite inserted and exploded. Seventy-five per cent. dynamite should be used to insure clean work, as lighter strength dynamite sometimes tends to shatter rather than to cut off the timber.

The Panama Railroad has contracted for 75,000 hard wood ties for use on the relocation of the railway. These ties will be accepted in two classes, those in one to be 7 in. by 9 in. by 8 ft. 6 in. long, and in the other 6½ in. by 8 in. by 8 ft. 3 in. long. The second class may not aggregate over 10 per cent. of the total number delivered. These ties will be purchased in Santo Domingo, for although there is hard wood in Panama no one could be found who would take a contract of this size to cut the timber.

General News Section.

At Pau, France, January 13, Jules Vedrines, flying in the aero-drome on his monoplane, made 88½ miles in one hour.

At Walbridge, Ohio, January 10, the carpenter and repair shops of the Hocking Valley were destroyed by fire; loss, including a coal house, a sand house, an oil house and a material shed, \$75,000.

The Chesapeake & Ohio, following prolonged conferences with its telegraphers and the government commissioners, Messrs. Knapp and Neill, has granted the operators an increase of pay, said to be 10 per cent.

The boilermakers working in the shops of the American Locomotive Company, who have been on strike for three months, in sympathy with the strike of the New York Central boilermakers, have called off their strike.

The Gulf, Colorado & Santa Fe announces the opening of passenger and freight traffic on that portion of its Lometa West extension from Brady, Tex., to Eden, a distance of 31.94 miles. This completes the extension from Lometa to Eden, 98.3 miles.

Chicago railway men have incorporated The Railroad Club of Chicago as a social organization with a membership of 350. Permanent club rooms will be established at 329 Plymouth Court. W. P. Gomph of the Transcontinental Freight Bureau is president.

The attorney-general of Texas has instituted a suit against the Chicago, Rock Island & Gulf to recover \$100,000 in penalties for alleged violation of the state law in running trains more than 30 minutes late during the month of January and February, 1910.

The Chicago & North Western on January 14 opened to traffic the last section of its new line between Milwaukee and Sparta. The line was opened from Milwaukee to Wyeville on December 11, and the last section extends from Wyeville to Sparata, 23.4 miles.

In the latest time table of the Salt Lake division of the Southern Pacific, Pacific standard time is used east of Sparks, Nev., instead of Mountain time. The change from Mountain to Pacific time is, therefore, now made at Ogden, Utah, instead of at Sparks.

Inspectors of the Interstate Commerce Commission have been conducting an investigation of the derailment of the Great Northern's "Oregonian" train, near Sharon, N. D., on December 30, which was caused by a broken rail. The commission has asked the railway to forward the rail to Washington.

The Isthmian Canal Commission has ordered 75,000 bayahonda ties from Santo Domingo. This wood is costly, but is harder and more durable than anything available in the United States; and the hard woods which grow on the isthmus are unavailable because thus far the commission has found no contractor who would cut and deliver ties in that territory.

The Pennsylvania Railroad, encouraged by the reduction in the number of trespassers killed along its lines, as a result of the persistent efforts of its officers during the past four years, intends to redouble its efforts during 1912. New warning notices will be put up and the authorities will be requested to enact more stringent laws. General manager S. C. Long has issued a circular to officers and employees, and has called upon all employees to assist in decreasing the death roll.

The attorney-general of Texas on January 4 filed in the District Court at Austin, Tex., suits to recover \$400,000 in penalties from the Missouri, Kansas & Texas of Texas, on account of train delays between September 8 and November 8, 1910, in alleged violation of the state law imposing penalties for trains over 30 minutes late. The Texas railway commission is also making a compilation of the train reports of other roads, with the intention, it is reported, of instituting additional suits.

The fifth annual report of the Oregon railway commission for the fiscal year ending June 30, 1911, calls attention to the increase in railways in the state from 2,051 miles to 2,899 miles since June 30, 1906, an increase of 838 miles, as compared with an increase of but 394 miles from 1889 to 1906. The report states that "it is demonstrable from the court records and the files of

this commission that the continuous annual saving to the shipping interests of the state due to rate reductions will conservatively aggregate \$750,000 annually."

Forty-six complaints have been filed in the United States district court at New Orleans against the Illinois Central, alleging violations of the safety appliance act. Eleven complaints are brought under the air brake provision of the law, 25 under the provision regarding the use of automatic couplers, and 10 under the provision relating to the use of grab iron. Suit has been entered in the United States district court at Salt Lake City against the Denver & Rio Grande for 15 violations of the hours of service law. The Illinois Central on January 3 pleaded guilty and was fined \$200 at Springfield, Ill., for violations of the hours of service law.

Statistics compiled by the pension department of the Southern Pacific show that since the establishment of the pension department in January, 1903, the sum of \$948,538 has been disbursed in pensions to retired employees. The total disbursements for last month were \$17,073, and for the year 1911 were \$184,704. Since the organization of the pension department the Southern Pacific has pensioned 692 of its former employees. The number on the pension roll at the close of 1911 was 467. The beneficiaries of the pension bureau in 1910 organized an annual reunion. This year the reunion will be held on May 10, the forty-third anniversary of the driving of the last spike, at Promontory, Utah, connecting the Central Pacific and Union Pacific railways.

Reports of delays to trains and interruption of traffic generally, by reason of the severely cold weather, have been general throughout the northern and western states for the past two weeks; and instances of passenger trains being stalled all night are "too numerous to mention." At Kinsley, Kan., two passenger trains being snowbound, the passengers had to secure accommodations at private houses, the hotels being insufficient. Snow blockades were reported in northwestern Texas as lasting a whole week. At Lynchburg, Va., a passenger train with many leaky pipes was frozen to the track so that it had to be bumped at the rear by three engines to loosen the wheels. Similar occurrences are reported in other places nearly as far south. On the Great Northern, near Java, Mont., January 10, a relief train headed by a rotary snowplow was knocked off the track by an avalanche, and fell over a precipice 100 ft. high, this accident, occurring while the temperature was 26 deg. below zero. Two men were killed. From Livingston, Mont., it was reported on the 10th that all trains were ordered to limit their speed to 20 miles an hour. At Utica, N. Y., where on January 9 the temperature fell to 12 deg. below zero, it was reported that 13 rails were found broken in the tracks between Rome and Greenway, four miles. In Chicago last week the work of the thousands of men engaged in switching and yard work was made at least 50 per cent. harder than usual by the difficulties incident to snow, ice and low temperatures. The president of the Ann Arbor Railroad, Newman Erb, returning from an inspection of the company's lines, reported that freight traffic was tied up through the northwest, and moreover, that insufficient forces caused much delay. On one railway, said Mr. Erb, 29 enginemen reported sick on one of the cold mornings of last week. Steamboats were much hindered and troubled by floating ice as far south as Memphis, Tenn., and at Louisville, Ky., the Ohio river was filled with ice. One observer says that the roads of the country as a whole have suffered more from cold weather than before in eight years, and that the delays and difficulties are due in part to the unpreparedness of the men. As a result of long immunity it is said that many men have not supplied themselves with proper clothing. A road which supplied its men with sheepskin lined coats is said to have had less trouble than some of its neighbors.

The Hine System Established on the Georgia & Florida.

The Hine system of organization has been established by the Georgia & Florida, and the number of officers is increased. This is intended to abolish the practice of having clerks sign the names of officers, and increases the authority of the officers. The following appointments have been made: A. Pope, formerly

traffic manager, is now assistant general manager, with office at Augusta, Ga.; D. F. Kirkland has been appointed superintendent, with office at Douglas, and the following officers are now assistant superintendents: R. S. Thompson, trainmaster; W. A. Walker, general roadmaster; J. F. Sheahan, master mechanic; W. A. Swallow, chief engineer, and A. E. Curling, car accountant, all with offices at Douglas, and the titles of trainmaster, general roadmaster, master mechanic, chief engineer and car accountant will be retained only as may be necessary for compliance with laws and existing contracts. H. C. McFadden, formerly general freight agent, is now traffic manager. C. H. Gattis, formerly general passenger agent, J. M. Crute and W. E. Blitchington are now assistant traffic managers, all with offices at Atlanta. The titles of general freight agent and general passenger agent will be retained by the present holders, or their successors, only as may be necessary for the proper compliance with the laws and existing contracts. W. F. Carroll and F. W. Schanck are assistant auditors.

Exports of Iron and Steel.

Figures compiled by the bureau of statistics, Department of Commerce and Labor, show that the United States follows England and Germany in the tonnage of iron and steel exports. The progress of the United States in that branch of commerce has been rapid, total exports of steel having increased from \$103,000,000 in 1901 to nearly \$250,000,000 in 1911. In the last ten years the United States has exported \$1,500,000,000 of iron and steel.

Safety of the Pennsylvania.

The Pennsylvania Railroad in 10 months has decreased the number of serious injuries to employees in its shops by more than 63 per cent., and in recognition of this work the American Museum of Safety on Thursday evening, January 18, presented a medal to the company as the American employer who, in its judgment, "had done the most for the protection of the lives and limbs of workmen, by means of safety devices for dangerous machines and processes." The medal was received by Vice-president W. W. Atterbury, head of the operating department.

In the fall of 1910 experts from one of the large accident insurance companies were employed and, accompanied by inspectors of the motive power department, inspected all of the road's larger shops. Following this, safety committees were organized on all divisions. As a result, the number of serious injuries per thousand shop employees, which in January was 8.7, was reduced as follows: February, 7.3; March, 8.3; April, 6.0; May, 7.9; June, 5.2; July, 4.7; August, 3.4; September, 3.4; October, 3.2. During this period, the average number of employees was 33,242.

The Pennsylvania's efforts toward protecting the lives of passengers and employees, in other directions are well known. Since 1906 all new passenger cars have been made of steel. In all new railway tracks, public crossings of highways at grade have been forbidden; and existing tracks have been safeguarded in ways innumerable.

Chicago Car Interchange Bureau.

The Chicago Car Interchange Bureau was organized on January 1 to supervise the inspection and recording of cars interchanged between roads within the Chicago district, under the auspices of the General Superintendents' Association. The bureau is a development of the Joint Car Inspection and Interchange Bureau organized July 1, 1910, to supervise interchange at the Union Stock yards, where an interesting experiment has been worked out in combining the work of car inspection for the mechanical department and the making of records required by the transportation department for cars interchanged. The office of the new bureau is at 603 Grand Central Station, and it is under the management of a chief interchange inspector, F. C. Schultz, heretofore chief car inspector of the Chicago division of the Chicago, Burlington & Quincy. The chief interchange inspector reports to an interchange committee of the General Superintendents' Association. An assistant interchange inspector is assigned to each of eight districts into which the city has been divided, the Union Stock Yards district being one. The Stock Yards bureau employs its own inspectors and will maintain its own rules and regulations, but its central office has been trans-

ferred to the office of the Chicago bureau and its chief interchange inspector, Charles Bossert, has been made one of the eight assistants. For the present the methods worked out by the Stock Yards bureau have not yet been extended to the other districts of the city, and in the latter the inspectors are still employed by the individual railways and render their reports as before instead of through the bureau. The assistants are now engaged in making a study of the conditions in their districts and in instructing the railway inspectors in the M. C. B. rules, in place of the former Chicago district rules, with the idea of having all the interchange inspection ultimately performed by the bureau. The work of the Stock Yards bureau has already demonstrated the efficiency of combining the mechanical and the transportation inspection, and has resulted in a marked improvement in the promptness with which reports are delivered.

Railway Supply Manufacturers' Association.

Circular No. 1 of the Railway Supply Manufacturers' Association gives such details as are at present available concerning the plans for the exhibits of the Master Mechanics' and Master Car Builders' conventions at Atlantic City, N. J., next June. The exhibits will be as usual on Young's Million Dollar Pier and 81,764 square feet of exhibit space has been provided, an increase of about 5,500 sq. ft. The arrangement of the space has been considerably improved. The price of space is 40 cents per sq. ft., as before. Space will be assigned on February 15, 1912, at the office of the secretary, J. D. Conway, Oliver building, Pittsburgh, Pa.

New York Railroad Club.

At the next regular meeting of the New York Railroad Club, to be held January 19, W. B. Potter, chief engineer of the railway department of the General Electric Company, Schenectady, N. Y., will present a paper on Self Propelled Motor Cars.

International Railway Fuel Association.

The fourth annual convention of the International Railway Fuel Association will be held at the Hotel Sherman, Chicago, May 22-25, 1912.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; annual May 7-10, Richmond, Va.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.
- AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, Seattle, Wash.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.
- AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichy, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
- AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Convention, 2d week in September.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILWAY CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMasters' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling; September, 1912, Buffalo, N. Y.

ST. LOUIS RAILWAY CLUB.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sellis, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md.

Traffic News.

The Canadian Pacific is to run a special train carrying a "traveling agricultural college" over its lines in New Brunswick; but not for several months yet.

Representatives of the railway passenger associations will meet in St. Louis on January 23, with the national baggage committee, representing the commercial interests, to discuss uniform arrangements for handling baggage.

Traffic representatives of the Union Pacific held their annual "family" meeting in Omaha on January 15. The meeting afforded opportunity for their first inspection of the new general office building, which has just been completed.

A feature of the dinner given by the Louisville Transportation Club on January 5 was a debate on the long and short haul clause of the Interstate Commerce law, participated in by three representatives each of the railways and the shippers.

The city of Shreveport, La., has established a quarantine against Fort Worth and Dallas on account of the prevalence of cerebro-spinal meningitis at those Texas cities; and at Fort Worth an order was issued last week discontinuing the sale of tickets to Shreveport.

The Southern Pacific, by making a slight change in the train schedules and by providing for a connection at Port Costa, Cal., between the Shasta Limited from Seattle, and the "Owl" for Los Angeles, has shortened the trip for passengers between Seattle and Los Angeles to 44 hours, a saving of nearly a day.

The Rock Island will operate an agricultural demonstration and lecture train between St. Louis and Kansas City, January 23-27. Lectures on dairying and poultry raising will be given by professors from the University of Missouri, and some of the best dairy cattle and poultry in Missouri will be shown on the train.

Special trains carrying members of the Western Classification Committee and shippers who will appear before the committee at the semi-annual meeting of the classification committee which began at Galveston, January 16, were run from Chicago on Sunday by the Chicago & Alton and Chicago & Eastern Illinois railroads.

The Texas & Pacific and the International & Great Northern have announced the organization of an agricultural department, effective on February 1, for the purpose of promoting the development of the agricultural resources of their territory. R. R. Claridge, now traveling immigration agent of the Gould Lines, will be at the head of the department.

The New York state superintendent of public works reports that the traffic on the canals of the state during the past season amounted to 3,007,068 tons, a slight increase over the preceding year. Only about 20 per cent. of this consisted of through shipments, and in both through and way shipments the eastbound movement greatly exceeded the westbound.

The Illinois Central has organized a subsidiary company, the Central Fruit Despatch, to handle its fruit and vegetable traffic, which has been showing a continuing increase. The company was incorporated in Illinois last week with \$1,500,000 capital stock. E. F. McPike, who has been refrigerator service agent of the Illinois Central, will be general manager of the despatch line.

A jury in the federal court at Memphis, Tenn., has awarded the Darnell-Taenzer Lumber Company reparation of 10 cents per 100 lbs. on all its shipments of hardwood lumber from southeastern territory to the Pacific coast during 1907 and 1908. The Interstate Commerce Commission in 1908 reduced the rate from 85 to 75 cents, and the case was prosecuted as a test in behalf of the members of the Hardwood Lumber Association.

J. M. Belleville, of Pittsburgh, president of the National Industrial Traffic League, has issued a circular to the members of that body, asking them to use their influence with members of Congress to secure favorable action on the request of the Interstate Commerce Commission for the construction of a fireproof building for the commission in Washington; this because the shippers of the country are vitally interested in the preservation

of the great mass of documents which are on file in the offices of the commission.

At a meeting of the Central Passenger Association on January 10, it was decided to make summer tourist fares this year from June 1 to September 30 from Chicago and St. Louis to eastern resorts on the same basis as last year, approximately a fare and a half for the round trip. The round trip fare to New York on this basis will be \$30 on the standard lines, and \$27 by the differential lines; to New Jersey points the rates will be \$29.50 and \$28.50.

From Cheyenne, Wyo., it is reported that the soldiers living at Fort Russell, two or three miles out of the city, have withdrawn their boycott against the Cheyenne Electric Railway, after going afoot six months as a protest against the rates of fare charged by the company. The company has agreed to establish a fare of 5 cents between Cheyenne and the fort, on the understanding that the regimental exchanges will buy not less than \$2,250 worth of tickets each month.

Beginning February 1, the Southern Railway will run a dairy instruction car over its lines, under the supervision of Dr. C. M. Morgan, dairy agent of the road. Assisted by experts from the state and federal agricultural departments, Dr. Morgan will "spread the doctrine of more and better cows," and of the improvement of milk, cream and butter. A car will be fitted up with all of the best kinds of machinery, and in the lectures to be given a stereopticon will be used. Free tests will be made of milk which may be offered, and cows will be examined and reported on.

Following a conference in Baltimore, called by Governor Crothers of Maryland, the governors of sixteen southern and southwestern states, acting in conjunction with the presidents of the principal railways in those states, have decided to create a large committee which will be charged with the duty of making and carrying out a plan to co-ordinate all of the agencies working to promote immigration to these states. Among the chief speakers at Governor Crothers' conference, were Presidents Finley of the Southern Railway, Johnson of the Norfolk & Western, and White of the Richmond, Fredericksburg & Potomac.

Shippers of explosives and dangerous articles are now required by law to keep themselves posted as to the provisions of the Interstate Commerce Commission's rules and to furnish and supply the necessary labels and placards on goods and cars shipped, the carriers being no longer required to furnish printed matter free of charge. Complying with frequent requests, Col. B. W. Dunn, chief inspector of the Bureau of Explosives, 30 Vesey street, New York, has prepared copies of all the necessary pamphlets, labels, etc., and has issued a circular giving the prices at which these will be sold by the single copy or in lots of 100, 500 or 1,000.

Conference committees have been appointed by the Chicago railways and the shipping interests of the city to handle questions relating to the uniform switching rates and regulations which were adopted last year for the Chicago district. The purpose of the committees was discussed in an editorial in the *Railway Age Gazette* of December 22, page 1262. One committee represents the railways, and another the shippers, and they will ordinarily meet separately, but if questions of sufficient importance arise the committees will meet jointly in an effort to effect a solution of the difficulty. The committee for the railways consists of C. G. Burnham, vice-president Chicago, Burlington & Quincy; William Hodgdon, freight traffic manager Pennsylvania Lines; Marvin Huggett, Jr., freight traffic manager Chicago & North Western; G. H. Ingalls, freight traffic manager New York Central Lines; E. S. Keeley, vice-president Chicago, Milwaukee & St. Paul, and W. L. Ross, vice-president Chicago & Alton. The shippers' committee consists of H. C. Barlow, Chicago Association of Commerce; Oscar F. Bell, Crane Company; Richard A. Hale and F. B. Montgomery, Illinois Manufacturers' Association; W. M. Hopkins, Chicago Board of Trade, and J. J. Wait, Hibbard, Spencer, Bartlett & Company.

Through car service from Chicago to California over the Chicago, Burlington & Quincy, and the Rock Island Lines via Ogden and Salt Lake City, which was withdrawn on December 19 on account of a controversy between these roads and the Southern Pacific, Western Pacific and San Pedro, Los Angeles & Salt

Lake over the method of division of the through fares, will be resumed beginning on January 28. The Burlington announces daily standard cars to San Francisco over the Denver & Rio Grande and Southern Pacific, daily tourist cars to Los Angeles over the Denver & Rio Grande and San Pedro, Los Angeles & Salt Lake, tri-weekly tourist cars to Los Angeles over the Denver & Rio Grande and Southern Pacific and tri-weekly tourist cars to San Francisco over the Denver & Rio Grande and Western Pacific. The Rock Island Colorado-California Express will have both standard and tourist cars to be run over the Western Pacific from Salt Lake City and from Ogden by the Southern Pacific. The lines west of Ogden and Salt Lake last year refused to shrink their proportion of the rates when the local rates from Salt Lake City to San Francisco and Los Angeles were ordered by the Interstate Commerce Commission to be reduced. The division controversy was recently settled by a compromise agreement.

Marking Express Shipments.

The following circular letter calling the attention of shippers to proper methods of marking and packing express shipments has been issued by the express agents of Chicago:

"Have you experienced loss of shipments by express? If so, have you considered that possibly you are partly to blame for that loss by incorrectly or insecurely marking your shipments?

"In the necessary haste in the handling of express shipments, especially where necessary to transfer them en route, unless package, box, barrel or other class of shipment is securely marked, there is a very great chance of mark being lost or torn off.

"Shipments should always be marked with brush or crayon on the box, package or crate if possible, or, better still, with a label showing the shipper's name and address as well as that of the consignee.

"Shipments which can be marked with a label pasted on shipment, or directly on the shipment itself, as above described, should never be marked with a tag alone; but in the case of castings or other shipments to which it is impossible to attach the mark by a label or on the shipment direct, and where a tag must be used, two tags should be attached, and in different places.

"Another frequent cause of loss of shipments in transit is failure on the part of shippers to remove old marks from second-hand boxes, barrels, cases, and even wrapping paper which is used. Packers and shipping clerks should be cautioned before using second-hand packages of any kind to remove all old marks.

"Will you not co-operate with the transportation companies in an effort to avoid loss to you and to them, by properly and securely marking your shipments?"

Grain Receipts at New York.

The receipts of grain at New York for the 12 months ending December 31, as reported by the Produce Exchange, amounted to about 120 million bushels, or 20 per cent. more than in the year preceding. The receipts by the different roads and by water were as follows in bushels:

	Per	Per
Routes.	Cent.	Cent.
N. Y. C.	1911.	1910.
West Shore	14,016,787	11.76
West Shore	27,014,823	22.66
Erie	18,847,357	15.80
Pennsylvania	8,213,344	6.89
D. L. & W.	19,564,431	16.41
Lehigh	17,162,401	14.38
B. & O.	2,006,694	1.70
Various	585,836	.50
Total rail	107,411,728	90.10
Total water	11,808,254	9.90
Total	119,219,982	100.00
		98,077,566
		100.00

It will be seen that the two lines of the New York Central brought in more than one-third of the whole.

Traffic Club of New York.

The regular meeting of the club will be held on Tuesday evening, January 23, at 8 p. m., at the Waldorf-Astoria. The entertainment committee has arranged for a vaudeville performance, to be followed by refreshments.

The entertainment committee has decided for the meeting of March 26 to give an amateur night, composed of local talent, and the chairman of the committee would appreciate any information as to members who would assist in this performance.

REVENUES AND EXPENSES OF RAILWAYS.

FIVE MONTHS OF FISCAL YEAR, 1912.

Mileage operated on November 30, 1912
21,982; 22,1180; 24,819; 25,360; 26,188; 27,218

JANUARY 19, 1912.

RAILWAY AGE GAZETTE.

REVENUES AND EXPENSES OF RAILWAYS.

FIVE MONTHS OF FISCAL YEAR, 1912—(CONTINUED).

Name of road.	Mileage operated		Operating revenues		Maintenance of way and structures, equipment.		Operating expenses		Transportation.		General.		Total.		Net operating revenue (or deficit).		Outside operations, net.		Taxes.		Operating income (or loss).	
	at end of period.	Freight.	Passenger.	Total, inc. misc.	Total, inc. misc.	Traffic.	Total, inc. misc.	Total, inc. misc.	Traffic.	Total, inc. misc.	Traffic.	Total, inc. misc.	Traffic.	Total, inc. misc.	Traffic.	Total, inc. misc.	Traffic.	Total, inc. misc.	Traffic.	Total, inc. misc.	Traffic.	Total, inc. misc.	Traffic.
Louisiana Ry. & Navigation	350	\$652,354	\$121,559	\$844,481	\$102,109	\$29,446	\$7,5712	\$1,207,726	1,207,726	\$31,842	\$537,835	\$296,646	\$23,300	\$7,273,346	\$1,411,235	\$20,409	\$23,300	\$7,447,750	\$1,141,235	\$684,080	\$7,022	
Louisville & Nashville & St. Louis	4,704 ³⁸	17,051,742	5,248,383	23,667,302	3,580,857	4,117,288	460,947	\$7,273,221	7,273,221	\$43,657	\$15,863,295	7,804,078	\$8,595	\$15,000	\$1,138,158	\$1,141,235	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059
Louisville, Henderson & St. Louis	199	331,106	186,361	519,931	128,169	50,980	21,280	\$7,273,221	1,207,726	\$398,720	1,207,726	\$151,211	\$1,170,509	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	
Maine Central	179	2,839,250	1,692,455	4,810,061	974,611	538,888	48,838	1,207,726	1,207,726	\$125,597	3,311,785	1,492,276	\$7,374	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	
Michigan Central	1,144	3,708,417	1,426,240	5,405,553	1,426,240	341,449	4,848,614	15,775	15,775	\$1,165,521	8,271,177	2,820,517	\$23,766	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	
Midland Valley	373 ⁴⁰	1,417,781	189,567	666,220	138,150	106,415	15,775	199,594	30,797	490,731	155,499	\$526	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059		
Minneapolis & St. Louis	1,077	1,272,377	2,001,180	5,236,052	1,931,701	1,192,256	1,055,697	174,540	2,240,592	149,232	4,233,414	\$8,595	\$1,194,197	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	
Missouri, Kansas & Texas	1,345 ⁴¹	3,167,763	1,667,416	5,223,671	1,094,402	447,922	120,570	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Mobile & Ohio	1,804 ³⁹	8,402,926	1,392,619	10,804,994	1,400,553	1,426,240	341,449	15,775	15,775	8,271,177	2,820,517	1,492,276	\$23,766	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	\$1,274,059	
Monongahela	644	3,489,669	1,291,314	5,265,646	1,532,707	282,978	136,515	15,775	15,775	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Nashville, Chattanooga & St. Louis	195	1,169,703	150,923	1,315,720	1,208,188	107,064	9,003	15,775	15,775	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
New Orleans, Mobile & Chicago	404	581,648	1,200,037	83,835	120,037	83,637	13,894	15,775	15,775	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
New York, Chicago & St. Louis	3,591 ⁴³	26,459,523	14,840,284	46,029,945	6,200,705	6,637,722	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
New York, New Haven & Hartford	6,018 ⁴⁹	19,886,583	7,489,807	1,409,914	4,889,912	609,450	1,207,726	254,882	254,882	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
New York, Ontario & Western	112	1,153,212	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	1,466,029	
New York, Philadelphia & Norfolk	1,200 ⁴⁶	14,167,332	1,974,041	16,284,271	2,117,243	3,094,355	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
New York, Susquehanna & Western	60,47	1,200,022	825,928	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	1,200,022	
Norfolk & Western	472 ⁴⁸	4,156,540	1,048,759	5,195,240	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Norfolk Southern	1,415	17,050,201	3,858,383	23,898,383	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Northern Central	7,96 ⁴⁷	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726		
Northern Pacific	1,689 ⁴⁹	6,542,782	2,234,266	9,297,934	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Oregon Short Line	1,919	6,715,268	2,381,931	9,096,084	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Oregon-Washington R. & Nav. Co.	296	583,800	149,601	720,022	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Pecos & Northern Texas	2,167 ⁵⁴	6,253,286	1,207,726	7,398,927	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Pennsylvania Co. R.	3,978 ⁵¹	43,735,608	15,281,610	57,929,527	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Pennsylvania R. R.	351 ⁵²	3,231 ⁵²	4,922,516	1,999,575	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Pittsburgh, Baltimore & Washington	71,333	4,063,004	3,367,424	7,216,904	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Pittsburgh, Cincinnati, Chic. & St. Louis	1,467 ⁵²	2,175,522	1,207,726	3,700,022	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Pittsburgh, Shawmut & Northern	240	450	810,729	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
Pittsburgh, Frederickburg & Potomac	468	810,729	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726		
St. Joseph & Grand Island	4,731	11,173,853	5,013,811	17,431,885	2,230,312	2,285,829	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	1,207,726	
St. Louis, Brownsville & Mexico	509 ⁵⁶	599,548	287,500	1,495	1,235,515	48,345	1,207,726	1,207,72														

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways, of the American Railway Association, in presenting statistical bulletin No. 111, giving a summary of car shortages and surpluses by groups from September 14, 1910, to January 3, 1912, says:

"The effect of the mild weather in the latter part of December and of the holidays is apparent in a further increase of 53,670 cars in the car surplus, the total surplus for the period ending January 3, 1912, being 142,316 cars as against 88,646 cars on December 20, 1911. This is 31,884 cars more than on January 4, 1911. There is a decrease in box car surplus of 3,216 cars compared with last year. The increase in surplus is chiefly in open cars, and, with the exception of group 6 (Iowa, Illinois, Wisconsin, Minnesota, Dakotas), although still showing a large surplus, decreased 2,176 cars in the total number of surplus cars. The car shortage shows a decrease of 5,454 cars as compared with the

length, dimensions and cubical capacity of the cars used. The information required by this order is, the commission says, substantially contained in the Official Railway Equipment Register, and the commission suggests that the simplest and most economical way in which railways can comply with this order would be to adapt that publication to these requirements and have it issued and filed with the commission.

The commission has modified its order relative to posting tariffs at stations so as to only order the posting of tariffs at every point at which a complete file of tariffs is required to be kept.

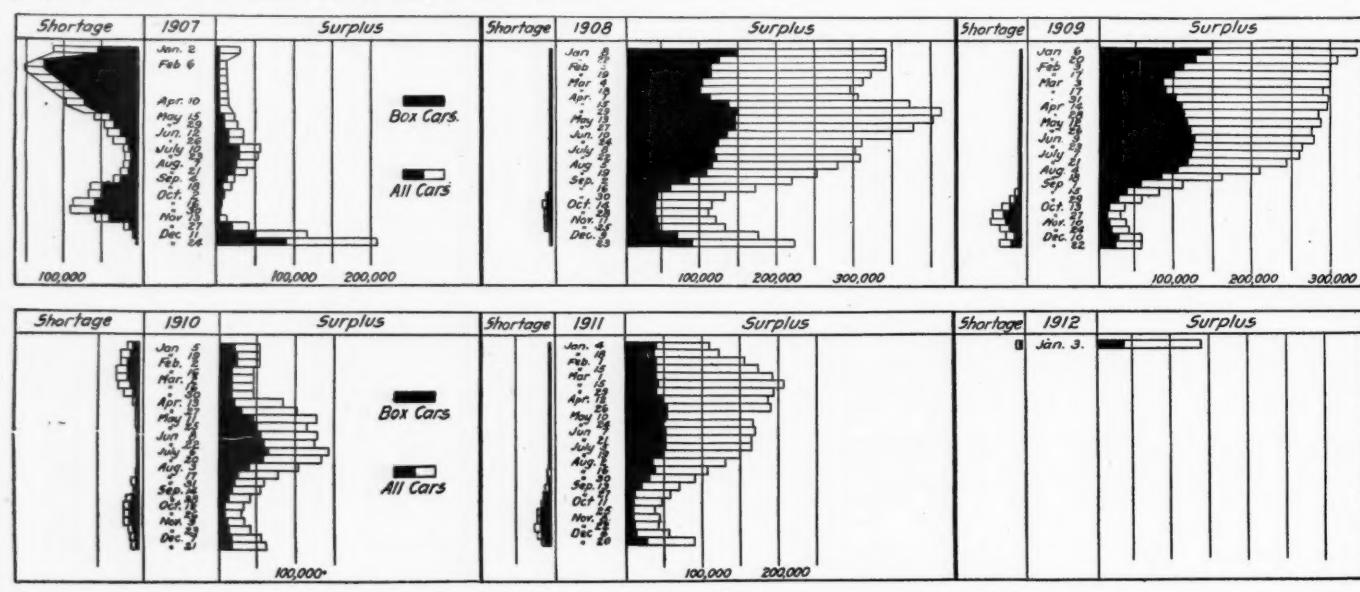
Reparation Awarded.

E. F. Sanguineti v. Illinois Central et al. Opinion by Commissioner Lane.

Rates charged on merchandise from certain eastern points to Yuma, Ariz., found to be unreasonable. (22 I. C. C., 185.)

Date.	No. of roads.	CAR SURPLUSES AND SHORTAGES.					Shortages				
		Surpluses			Shortages		Surpluses			Shortages	
		Box.	Flat. and hopper.	Other kinds.	Total.	Box.	Flat. and hopper.	Other kinds.	Total.	Box.	Flat. and hopper.
Group *1.—January 3, 1912.....	7	1,122	2,150	2,812	6,451	0	0	0	30	30	9
" 2. " " 3, 1912.....	25	3,442	337	14,271	24,025	6	0	0	3	3	9
" 3. " " 3, 1912.....	25	6,655	1,163	33,182	45,501	284	0	0	22	306	
" 4. " " 3, 1912.....	11	1,259	131	3,981	6,791	111	4	0	0	115	
" 5. " " 3, 1912.....	20	1,739	348	1,640	5,069	140	65	72	15	292	
" 6. " " 3, 1912.....	23	6,360	888	3,529	15,850	304	5	6	10	325	
" 7. " " 3, 1912.....	3	641	901	46	765	0	0	0	0	0	0
" 8. " " 3, 1912.....	18	2,913	500	1,569	2,353	0	30	0	0	30	
" 9. " " 3, 1912.....	10	3,890	205	563	5,606	0	0	0	0	0	0
" 10. " " 3, 1912.....	20	7,133	1,969	3,126	21,915	163	0	10	0	173	
" 11. " " 3, 1912.....	5	991	412	0	308	1,711	4,945	0	153	5,098	
Total	167	36,145	9,004	64,719	32,448	142,316	5,953	104	88	233	6,378

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages.

previous report. Of the 5,454 car decrease, 3,712 are box, 158 are flat, 1,381 are coal and 203 are miscellaneous cars. The recent and present cold weather will probably result in decreasing the surplus next reported to about the figure of last year."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 to 1911.

INTERSTATE COMMERCE COMMISSION.

The commission has ordered that all railways shall by July 1, 1912, either cancel all provisions in their tariffs that provide that minimum charges shall be based on the marked capacity, length or cubical capacity of the cars used, or publish and file with the commission publications showing the marked capacity,

Definition of an Interstate Service.

Citizens of Somerset, Md., Drummond and Friendship Heights v. Washington Railway & Electric Co. et al. Opinion by the commission.

There are three street or interurban railway companies operating which together form a line between the business district of Washington and Somerset in Maryland. The Washington Railway & Electric operates as far as Georgetown, in the District of Columbia, and transfers to the Georgetown & Tennytown, which operates as far as the district line, and the Washington & Rockville, a Maryland corporation, which operates between Rockville, Md., and a point within the District of Columbia. Heretofore a passenger could ride from the business district of Washington to Somerset for a cash fare of five cents or a ticket sold six for 25 cents. After the passing of a law by the state of Maryland reducing the number of five-cent zones on the Wash-

ington & Rockville, in Maryland, from four to three, the company began charging a five-cent fare from Somerset to the district line, and an additional five-cent fare to get from the district line into or through Washington. This increase in fare took place since the passage of the Mann-Elkins amendment, and therefore the commission holds that the burden of proof to justify the increase rests on the railway company. The commission holds that it has jurisdiction in the case since the Commerce Court has upheld the commission in its contention that it has jurisdiction over street railways doing an interstate business. The contention of the defendants that they do not do an interstate business, because the District of Columbia companies only carry passengers as far as the District of Columbia line, is found by the commission not to be in accordance with the facts. The commission finds that passengers are carried through without change of cars; that cars are run through without change of crews, and that the companies have heretofore held out their service as a through route. This the commission finds to constitute interstate business, and since no other justification is offered for the rate than the Maryland law, which the commission finds does not affect interstate business, the defendants are ordered to restore the former single five-cent rate. (22 I. C. C., 187.)

STATE COMMISSIONS.

The Indiana Commission has proceeded in court against the Pennsylvania for violation of the state law requiring locomotives to be equipped with automatic bell ringers.

The Georgia Railroad Commission has declined to order a reduction in fares on the lines of the Savannah Electric Company. Employing the American Audit Company to examine the company's books for 12 months past, the commission found that the net earnings on a fair valuation had amounted to 6.75 per cent, which was held not to be excessive.

The South Carolina commission has adopted and published a standard freight tariff, making uniform regulations for all of the more important railways of the state, but not materially changing the rates. The commission has also issued an express tariff, reducing the rates for merchandise packages for certain distances, the reduction amounting, according to one report, to 8 per cent.

The Railroad Commission of Louisiana has fined the New Orleans Great Northern \$1,000 for failing to operate its trains on schedule time, post bulletins when its trains were late, accept freight destined to Hill Switch, failing to have its coaches properly heated and supplied with ice water, and failing to keep its roadbed in safe condition between St. Tammany station and Pearl River. The commission says that the evidence was so conflicting that it found it necessary to appoint a committee of competent engineers to make an independent investigation.

The New York Public Service Commission, Second district (up State), has given the Catskill Traction Company permission to extend its line from Leeds to Cairo, seven miles. This extension parallels the steam road of the Catskill Mountain Railway, and while the commission finds that there is clearly not enough business to support two parallel steam roads, the fact that the extension is a trolley road, which will have low fares and serve conveniently people living along the highway, makes it possibly profitable. The commission, however, makes as a condition of its permission a limitation of bond issue to \$11,900 per mile, the balance of the money required to build the line to be raised by the sale of \$60,000 6 per cent. cumulative stock to be sold at not less than par. The commission says that it understands that this stock will be raised principally by local investors who are familiar with the business which is proposed to be developed by the new extension. The commission does not believe that the adverse effect on the Catskill Mountain Railway is sufficient cause for the denial of the application, and that there is reason to believe that the electric line will have but little adverse effect on the earnings of the steam line, and on the contrary, that the new line may build up the territory and justify the establishment of additional accommodations for summer boarders, and in the end increase the freight traffic and thus at least partially offset the reduction in the passenger earnings.

COURT NEWS.

The Indiana Appellate Court, in an opinion by Justice Myers, has held that the Postal Telegraph Company cannot enjoin the Chicago, Lake Shore & South Bend Electric Railway, whose line parallels the Postal wires on the adjoining right-of-way from using the single-phase alternating current at 32,000 volts in propelling its cars, thereby producing in the telegraph wires induced currents which interfere with the transmission of messages.

The Supreme Court of Louisiana on January 15, sustained the right of a negro to a seat in a street car, in New Orleans, notwithstanding the existence of a "Jim Crow" law. It appears that the negro, Joseph Anderson, had taken a seat in the compartment assigned to negroes, but that the movable partition between the white and black compartments was afterwards put into a different position, so as to bring Anderson's seat within the white compartment. After this change, the person in charge of the car sought to eject Anderson; but as there was no seat in the newly established black compartment, the court sustains him in his right to stay in the seat which he occupied.

Federal Employers' Liability Law Sustained.

The Supreme Court of the United States in an opinion by Justice Van Devanter has upheld the constitutionality of the employers' liability act of 1908 in four cases before it, the principal ones being the New York, New Haven & Hartford vs. Mondon and the Northern Pacific vs. Babcock. The Court of Appeals for the state of Connecticut, which held that an action to recover under the law could not be brought in a state court is overruled, and the case remanded. The judgment of the court was written by Judge (now Governor) Simeon E. Baldwin. The action was brought in one of the courts of the state by a fireman to recover damages for personal injuries sustained in the line of employment and due to the negligence of a fellow servant. The action was brought under the Federal law, although begun in the state court.

In a demurrer the railway not only attacked the constitutionality of the Federal employers' liability act, but also raised the point that action arising under a Federal law could not be brought in the same court. The demurrer was sustained. The Supreme Court in reversing this judgment says:

"We are quite unable to assent to the view that the enforcement of the rights which the congressional act creates was originally intended to be restricted to the Federal courts. The act contains nothing which is suggestive of such a restriction. The circuit courts of the United States have original cognizance, concurrent with the courts of the several states, of all suits of a civil nature, at common law or in equity, where the matter in dispute exceeds, exclusive of interest and costs, the sum of \$2,000, and arising under the constitution or laws of the United States. . . . By an amendment made in 1910 it is declared that 'the jurisdiction of the courts of the United States under this act shall be concurrent with that of the courts of the several states, and no case arising under this act and brought in any state court of competent jurisdiction shall be removed to any court of the United States.'"

"The amendment," says Justice Van Devanter, "instead of granting jurisdiction to the state courts presupposes that they already possessed it."

Justice Van Devanter says further:

"The suggestion that the act of Congress is not in harmony with the policy of the state, and therefore that the courts of the state are free to decline jurisdiction, is quite inadmissible, because it presupposes what in legal contemplation does not exist. When Congress in the exercise of the power conferred on it by the constitution adopted the act it spoke for all the people and all the states, and thereby established a policy for all. That policy is as much the policy of Connecticut as if the act had emanated from its own legislature, and should be respected accordingly in the courts of the state."

"The exercise of jurisdiction by the state courts will not be attended by any appreciable inconvenience or confusion; but, be this as it may, it affords no reason for declining a jurisdiction conferred by law. The existence of the jurisdiction creates an

implication of duty to exercise it, and that its exercise may be onerous does not militate against that implication.

"Besides, it is neither new nor unusual in judicial proceedings to apply different rules of law to different situations and subjects, even although possessing some elements of similarity, as where liability of a public carrier for personal injuries turns upon whether the injured person was a passenger, an employee or a stranger. But it never has been supposed that the courts are at liberty to decline cognizance of cases of a particular class merely because the rules of law to be applied to their adjudication are unlike those applied in other cases."

In the other three cases the court holds that certain things are well established as to the power of Congress under the commerce clause of the constitution, among them that the term "commerce" means more than mere exchange of goods and embraces "commercial intercourse in all its branches, including transportation of passengers and property by common carrier whether carried on by water or by land"; that the right "to regulate" gives Congress the power "to foster, protect, control and restrain, with appropriate regard for the welfare of those who are immediately concerned and of the public at large"; also that the power "is complete in itself and extends incidentally to every instrument and agent by which such commerce is carried on" and may be exerted "to its utmost extent over every part of such commerce."

It was contended that Congress exceeded its power by abrogating the "fellow servant" rule and restricting the defenses of contributory negligence and assumption of risk; that the regulations were faulty in that they limited the liability to instances where the injured employee is engaged in interstate commerce and do not confine it to instances where both the employee injured and the co-employee through whose negligence the injury may have occurred were in interstate commerce; that the law interferes with the liberty of contract and finally that it creates a favored class of employees in interstate commerce.

Replying to these contentions the court reiterates its doctrine that a person has "no vested interest in any rule of the common law." The act under consideration, says the decision, departs from the common law in the matter of the fellow servant, the comparative negligence of the employee, the denial of the assumption of risk and the benefits accorded designated relatives in the case of death.

"The natural trend of the changes described," says the decision, "is to impel the carrier to avoid and prevent the negligent acts and omissions which are made the basis of the rights of recovery, and as whatever makes for that end tends to promote the safety of the employees and to advance the commerce in which they are engaged we entertain no doubt that in making those changes Congress acted within the limits of the discretion confided to it by the constitution.

"We are not unmindful that the end was being measurably attained through the remedial legislation of the various states, but the legislation has been far from uniform, and it undoubtedly rested with Congress to determine whether a national law, operating uniformly in all the states upon all carriers by railway engaged in interstate commerce, would better subserve the needs of the commerce."

The objection that Congress erred in including cases where the culpable fellow-servant might be engaged only in intrastate commerce the court dismisses with the observation that such a theory treats of the "source of injury rather than its effect upon interstate commerce, as the criterion of congressional power."

Of the curtailed right of contract implied in the act's declaration that assumption of risk by the employee shall not free the employer from liability, the court said:

"If Congress possesses the power to impose the liability, which we hold that it does, it also possesses the power to insure its efficiency by prohibiting any contract, rule, regulation, or device, in evasion of it."

The creation of classes by the selection of only employers and employees in interstate railway traffic is not unconstitutional, nor does the constitution condemn exertions of the power merely because they occasion some inequalities. On the contrary it admits of the exercise of a wide discretion in classifying according to general rather than minute distinction and condemns what is done only when it is done without any reasonable basis, and therefore is purely arbitrary. Tested by this standard, this classification is not objectionable.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

The Hine system of organization has been established on the Georgia & Florida. See an item under General News.

E. C. Wells has been appointed auditor of the Jasper & Eastern, a part of the Santa Fe system, with office at Kirbyville, Tex.

H. C. Hale has been appointed treasurer and auditor of the Texas City Terminal Company, with office at Texas City, Tex., succeeding R. B. Smith, resigned.

H. U. Wallace, vice-president of the Fort Dodge, Des Moines & Southern, having resigned, the duties of that office have been assumed by C. H. Crooks, general manager.

H. H. Field, general counsel of the Chicago, Milwaukee & Puget Sound at Seattle, Wash., has been appointed general solicitor of the Chicago, Milwaukee & St. Paul, with office at Chicago.

W. E. Shirley, assistant claims attorney of the Quincy, Omaha & Kansas City at Kansas City, Mo., has been appointed claims attorney, with office at Kansas City, succeeding W. S. McCaull, resigned.

Frederick W. Whitridge, for the past four years receiver of the Third Avenue Railroad at New York, has been elected president of the new Third Avenue Railway Company, and Edward A. Maher has been elected vice-president and general manager.

J. S. Pyeatt, superintendent of the St. Louis & San Francisco at Chaffee, Mo., has been elected vice-president and general superintendent of the St. Louis, San Francisco & Texas and the Fort Worth & Rio Grande, with office at Fort Worth, Tex., succeeding W. B. Drake, resigned to engage in other business.

Joseph Taney Willcox, who was appointed assistant secretary of the Pennsylvania Railroad, with office at Philadelphia, Pa., as has already been announced in these columns, was born at Glen Mills, Delaware county, Pa., on September 15, 1886, and was educated at St. Joseph's College and Roman Catholic High School, Philadelphia. He was admitted to the bar in October, 1907, and was appointed assistant to the secretary of the Pennsylvania Railroad in October, 1910, which position he held at the time of his recent appointment as assistant secretary, as above noted.

Col. W. A. Henderson, general solicitor of the Southern Railway and the Northern Alabama Railway, with headquarters at Washington, D. C., has been assigned to special service, reporting as heretofore to the general counsel at Washington, and L. E. Jeffries, division counsel for Alabama, has been appointed general attorney, with headquarters at Washington, D. C. J. T. Stokeley has been appointed division counsel for the Alabama law division, with headquarters at Birmingham, Ala., and Pettus, Fuller & Lapsley have been appointed assistant division counsel, with headquarters at Selma, Ala.

B. L. Winchell has been elected chairman of the board and vice-president of the New Orleans, Mobile & Chicago, with office at St. Louis, Mo. W. F. Owen, vice-president and general manager, has been elected president, with office at Mobile, Ala. M. H. Smith has been elected vice-president, with office at Louisville, Ky. George W. Crary, secretary and treasurer, has been appointed treasurer, with office at Mobile, and T. D. Heed has been appointed assistant treasurer, with office at New York. F. H. Ricker has been appointed secretary, with office at Mobile, and H. L. Borden has been appointed assistant secretary, with office at New York. B. L. Winchell is also president and T. D. Heed assistant secretary and assistant treasurer of the St. Louis & San Francisco. M. H. Smith is also president of the Louisville & Nashville.

William Alfred Worthington, assistant to the director of maintenance and operation of the Union Pacific System and the Southern Pacific Company, has been appointed assistant director of maintenance and operation, with office at New York, succeeding W. B. Scott, recently elected vice-president and general manager of the Union Pacific at Omaha, Neb. Mr. Worthington was born

on June 18, 1872, at Vallejo, Cal., and was educated in the public schools. He began railway work on March 1, 1887, with the Southern Pacific as stenographer and clerk in the superintendent's office at Sacramento, and in 1888 was appointed secretary and chief clerk in the office of the engineer of maintenance of way at San Francisco. In October, 1893, he was promoted to statistician of the general manager's office, and two years later was made chief clerk of the same office. He was transferred as chief clerk to the assistant to the president in October, 1901, and on April 1, 1904, was made chief clerk in the office of the director of maintenance and operation of the Union Pacific System and the Southern Pacific Company at Chicago. Mr. Worthington was promoted to assistant to the director of maintenance and operation, with office at Chicago on November 1, 1907, which position he held at the time of his recent appointment as assistant director of maintenance and operation, with office at New York.

Major Charles Hine, who, as special representative of the director of maintenance and operation of the Harriman Lines, has had charge of the installation of the unit system of organization on those lines, has been elected vice-president and general manager of the Southern Pacific of Mexico and the Arizona Eastern, with office at Tucson, Ariz., effective January 15. Major Hine was born March 15, 1867, at Vienna, Va. He graduated in 1885 from the high school at Washington, D. C., in 1891 from the United States Military Academy at West Point, and in 1893, while serving as a lieutenant in the United States Army, graduated from the Cincinnati Law School, and was admitted to the bar. In 1895 he resigned his army commission and entered the service of the Cleveland, Cincinnati, Chicago & St. Louis, with which company he remained for four years as freight brakeman, switchman, yardmaster, emergency conductor, chief clerk to superintendent and trainmaster. In 1898 he obtained a leave of absence and served through the Santiago campaign in the Spanish war as major of the United States volunteers. On February 1, 1899, he returned to the service of the Big Four as trainmaster at Cincinnati, and on September 1, 1899, was appointed general superintendent of the Findlay, Fort Wayne & Western. This position he resigned to take charge of his father's estate in Virginia. Since that time he has been engaged in special railway work in various staff positions on both large and small railways, including the Chicago & Alton, the Chicago, Rock Island & Pacific, the St. Louis & San Francisco, the Chicago, Burlington & Quincy, the Erie, the Delaware & Hudson, the Intercolonial and the National Railways of Mexico. In 1900 he was for a time inspector of safety appliances for the Interstate Commerce Commission. In 1907 he assisted in the revision of business methods of the Department of the Interior at Washington; in 1907 and 1908 he was receiver of the Washington, Arlington & Falls Church Electric Railway, and in 1910, as temporary special representative to President Taft, outlined a program for improving the organization and methods of the executive departments of the United States government. From July, 1908, until the date of his new position he held the title of special representative of Julius Kruttschnitt. Major Hine is the author of many magazine articles and of two series of "Letters from an Old Railway Official to His Son," the first of which was published in *The Railway Age* in 1904, and the second in the *Railway Age Gazette* in 1911.

Operating Officers.

The Hine system of organization has been established on the Georgia & Florida. See an item under General News.



Charles Hine.

W. H. Homan, chief despatcher of the Texas & Pacific at Big Spring, Tex., has been appointed trainmaster, with office at Big Spring, and C. C. Kilway, night chief despatcher, succeeds Mr. Homan.

The office of J. G. Lorton, superintendent of terminals of the St. Louis and San Francisco, at Oklahoma City, Okla., has been abolished, and the jurisdiction of the superintendent of the Southwestern division has been extended to cover that terminal.

C. M. Bryant, formerly assistant general manager of the Missouri, Kansas & Texas, of Texas, who was granted a leave of absence on account of illness about three months ago, has been appointed superintendent, with office at Greenville, Tex., succeeding F. S. James, assigned to other duties.

O. H. McCarty, superintendent of the St. Louis & San Francisco at Sapulpa, Okla., has been appointed superintendent, with office at Chaffee, Mo., succeeding J. S. Pyeatt, elected vice-president and general superintendent of the St. Louis, San Francisco & Texas. W. G. Koch, assistant superintendent at Newburg, Mo., succeeds Mr. McCarty.

H. E. Bruffey, trainmaster of the Fayetteville district of the Atlantic Coast Line at Rocky Mount, N. C., has been appointed trainmaster of the Richmond district, with office at Richmond, Va., succeeding G. B. McClellan, who has been transferred as trainmaster to the Fayetteville district, with office at Rocky Mount, N. C., succeeding Mr. Bruffey.

W. H. Dabney, division agent of the Delaware & Hudson, at Albany, N. Y., in charge of the territory from Saratoga Springs to Rouses Point and all branch lines, has been appointed division agent in charge of the territory from Ballston Spa to Binghamton, and all branch lines, with office at Albany, succeeding W. W. Bates promoted. H. A. Empie succeeds Mr. Dabney.

William Doherty, traffic manager of the St. Louis, Brownsville & Mexico at Kingsville, Tex., has been appointed assistant general manager of that road and the New Orleans, Texas & Mexico, with office at Kingsville, reporting to J. H. Elliott, vice-president and general manager at Houston, Tex. R. B. Fowler, general manager of the New Orleans Terminal Company at New Orleans, La., has been appointed superintendent of the St. Louis, Brownsville & Mexico, with office at Kingsville, succeeding to the duties of C. B. Rodgers, general manager, resigned; and the office of general manager of that road has been abolished. The title of J. D. Finnegan, superintendent at Kingsville, has been changed to assistant superintendent.

Alexander Purves Gest, who was appointed to the new position of special agent of the New Jersey division of the Pennsylvania Railroad, as has already been announced in these columns, was born on February 2, 1853, at Philadelphia, Pa., and was educated at the school of Dr. J. W. Faires, the University of Pennsylvania, and the Rensselaer Polytechnic Institute, graduating from the latter institution in 1874 with the degree of civil engineer. He entered the service of the Pennsylvania Railroad in 1875, in the engineering department. On March 1, 1883, he was appointed division engineer of the Monongahela division, and the following October was transferred in the same capacity to the Pittsburgh division. He was again transferred as division engineer in January, 1886, to the New York division. Mr. Gest was appointed superintendent of the Bedford division in September, 1889, and in January, 1891, was transferred in the same capacity to the Frederick division, and since January, 1893, until his recent appointment as special agent of the New Jersey division he was superintendent of the Belvidere division.

James Buckelew, whose appointment as superintendent of the West Jersey & Seashore, with office at Camden, N. J., has been announced in these columns, was born on October 7, 1864, at Jamesburg, N. J., and entered the service of the Pennsylvania Railroad on July 23, 1885, in the engineering department as a rodman. He was later transferred to the maintenance of way department, and was made assistant supervisor in May, 1888, and was promoted to supervisor in April, 1890. In January, 1900, he was appointed assistant engineer of the Renova division, and the following January he was transferred in the same capacity to the Tyrone division, and one year later was again transferred in the same capacity to the Pittsburgh division. He was appointed principal assistant engineer of the

Philadelphia, Baltimore & Washington on June 1, 1903, and on January 1, 1906, he was appointed superintendent of the Central division. In April, 1907, he was transferred in the same capacity to the Allegheny division, which position he held at the time of his recent appointment as superintendent of the West Jersey & Seashore.

E. M. Rine, whose appointment as general superintendent of the Delaware, Lackawanna & Western, in charge of the transportation department, with office at Scranton, Pa., has been announced in these columns, was born on September 4, 1867, at Brilliant, Ohio, and was educated in the public schools. He began railway work in September, 1886, as a telegraph operator on the Cleveland & Pittsburgh, on the River division of the Pennsylvania Company. He later went to the Baltimore & Ohio, serving as train despatcher and then as trainmaster until October 4, 1899, when he went to the Delaware, Lackawanna & Western as train despatcher. About two months later he was made chief train despatcher, and then for seven months was trainmaster, when he became superintendent at Scranton, Pa., and from August, 1900, until March, 1908, he was superintendent of the Morris & Essex division of that road. He was promoted to assistant general superintendent on December 1, 1910, which position he held at the time of his recent appointment as general superintendent, as noted above.

John Wilfred Higgins, assistant general manager of the Missouri Pacific-Iron Mountain system at St. Louis, Mo., who has been appointed general manager, with office at St. Louis, as has been announced in these columns, was born October 12, 1864, at Newport, R. I., and began railway work as a messenger on the Illinois Central when he was 15 years old. From that time until June, 1892, he was consecutively, track laborer, switchman, telegraph operator, freight and passenger brakeman and baggageman, freight conductor, chief clerk to the superintendent of the Chicago division, trainmaster of the Centralia district, chief clerk to the general superintendent, and assistant superintendent of the Louisiana division. For six months from June, 1892, he was superintendent of the same division, and was then until April, 1896, superintendent of terminals, first at New Orleans, and then at Chicago. From April, 1896, to May, 1899, he was superintendent of the Amboy division, and on the latter date was made superintendent of transportation. He was promoted to general superintendent of transportation of the Illinois Central system on January 1, 1901, which office he held for two years and a half. For over a year, from September, 1903, he was with the Grand Trunk as assistant superintendent, first on the Eastern, and then on the Middle division. He went to the Missouri Pacific as inspector of transportation in December, 1904, and in March of the following year was appointed assistant general manager, from which office he has just been promoted.

Charles Otto Dambach, whose appointment as superintendent of the Wabash Pittsburgh Terminal and West Side Belt, with office at Pittsburgh, Pa., has been announced in these columns, was born on January 15, 1877, at Greenville, Pa., and was educated in the public and high schools of his native town. He began railway work in February, 1893, with the Pennsylvania Lines West of Pittsburgh as a clerk, and in August of the same year he went to the Pittsburgh, Shenango & Lake Erie, now part of the Bessemer & Lake Erie, as telegrapher and clerk in the office of the superintendent of transportation and was then consecutively baggage master, assistant weigh master, yard-

master, extra despatcher, chief clerk in the car record office, then chief clerk to the trainmaster and acting trainmaster, with the same company. In September, 1902, he was appointed assistant general yardmaster of the Standard Steel Car Company, at Butler, Pa. In March, 1903, he went to the West Side Belt Railroad as chief clerk to the superintendent, and was promoted to chief despatcher in June, 1905. The following October, he was made chief clerk to the general superintendent of the Wabash Lines east of Toledo, the West Side Belt having been consolidated with that system, and shortly afterwards he was appointed also superintendent of telegraph. On July 1, 1907, he was appointed trainmaster of the Eastern district of the Pittsburgh-Toledo division of the Wabash Lines east of Toledo, and at the time of the separation of the Wabash Pittsburgh Terminal and the West Side Belt from the Wheeling & Lake Erie on account of receivership proceedings, he remained with the former companies, and on June 15, 1908, he was appointed trainmaster of these companies, which position he held at the time of his recent appointment as superintendent, as above noted.

Victor Wierman, whose appointment as superintendent of the Trenton division of the Pennsylvania Railroad, with office at Camden, N. J., has been announced in these columns, was born at Towanda, Bradford county, Pa., on December 20, 1855, and was educated at preparatory schools, also the Harrisburg Academy, and graduated from LaFayette College, Easton, in 1876.

The same year he entered the chief engineer's office of the Pennsylvania Canal Company, at Harrisburg, Pa., and previous to November, 1878, he was engaged in making right of way surveys for that company and was in the service of the Lehigh Valley Railroad. Mr. Wierman went to the Pennsylvania Railroad on November 14, 1878, as assistant supervisor on the New York division, with office at New Brunswick, N. J., and in May, 1882, was promoted to supervisor on the same division. In December, 1884, he was appointed assistant engineer of the Western Pennsylvania division, and in January, 1886, was transferred in the same capacity to the Pittsburgh division. He was promoted to superintendent of the Bedford division in October, 1893, and two years later was made superintendent of the Lewistown division. He was transferred as superintendent on January 1, 1899, to the Frederick division, and in February, 1902, was again transferred as superintendent to the Amboy division. On January 1, 1912, when the Amboy and Belvidere divisions were combined to form the Trenton division, he was appointed superintendent of that division, with headquarters at Camden, N. J.

V. Wierman.



J. W. Higgins.



He was promoted to supervisor on the same division. In December, 1884, he was appointed assistant engineer of the Western Pennsylvania division, and in January, 1886, was transferred in the same capacity to the Pittsburgh division. He was promoted to superintendent of the Bedford division in October, 1893, and two years later was made superintendent of the Lewistown division. He was transferred as superintendent on January 1, 1899, to the Frederick division, and in February, 1902, was again transferred as superintendent to the Amboy division. On January 1, 1912, when the Amboy and Belvidere divisions were combined to form the Trenton division, he was appointed superintendent of that division, with headquarters at Camden, N. J.

Traffic Officers.

The Hine system of organization has been established on the Georgia & Florida. See an item under General News.

Reuben M. Andreas has been appointed traveling passenger agent of the Union Pacific, with headquarters at Minneapolis, Minn.

J. E. Hansen has been appointed agent of the Lackawanna Line, with office at Des Moines, Iowa, succeeding C. R. Strickler, transferred to Peoria, Ill.

E. L. Davison has been appointed assistant foreign freight agent of the Mobile & Ohio and the Southern Railway, with headquarters at Mobile, Ala.

James A. Cummiskey has been appointed advertising agent of the Queen & Crescent Route, with office at Cincinnati, Ohio, succeeding W. F. Beyreiss, deceased.

J. Q. David, traveling freight agent of the Chicago, Indianapolis & Louisville at Chicago, has been appointed traveling freight agent, with office at Indianapolis, Ind.

D. M. Dodge has been appointed general agent of the Louisiana Railway & Navigation Company, with office at Kansas City, Mo., succeeding E. C. Hastings, resigned to go into other work.

W. G. Grutchfield, traveling freight agent of the Southern Railway Company at Anniston, Ala., has been appointed commercial agent with office at Anniston, and his former position has been abolished.

I. P. Spining, general agent in the passenger department of the Cleveland, Cincinnati, Chicago & St. Louis and the Michigan Central, with office at Chicago, has resigned to engage in other business.

Ely Ensign has been appointed southwestern passenger agent of the Atlanta & West Point and the Western Railway of Alabama, with headquarters at Houston, Tex., succeeding C. C. Johnston.

Charles J. Koepsell, soliciting freight agent of the Kansas City Southern at Chicago, has been appointed traveling freight agent, with headquarters at Chicago, and Charles G. Douglas succeeds Mr. Koepsell.

R. H. McKay, commercial agent of the Atlanta, Birmingham & Atlantic, at Thomasville, Ga., has been appointed commercial agent at Moultrie. E. M. Fleming succeeds Mr. McKay, with office at Thomasville.

Charles N. Gray, chief clerk to the commercial agent of the St. Louis & San Francisco at Dallas, Tex., has been appointed soliciting freight agent, with office at Dallas, succeeding W. H. Winnfield, resigned.

R. J. McMillan, chief clerk to the traffic manager of the St. Louis, Brownsville & Mexico, has been appointed general freight and passenger agent, with office at Kingsville, Tex., succeeding to the duties of William Doherty, traffic manager, promoted, and the office of traffic manager has been abolished.

James E. Williams, assistant general freight agent of the Pere Marquette at Detroit, Mich., having resigned to go with the Uniform Classification Committee, the duties of his office have been assumed by the general freight department, under the immediate direction of R. P. Paterson, assistant general freight agent at Detroit. A. Harry Greenly has been appointed chief of the tariff bureau, in charge of the compilation and publication of tariffs, with office at Detroit.

J. R. Christian, general freight agent of the Galveston, Harrisburg & San Antonio, the Houston & Texas Central, the Houston East & West Texas and the Houston & Shreveport; T. J. Anderson, general passenger agent, and Gentry Waldo, assistant general freight agent, all at Houston, Tex., have had their jurisdiction extended over the Texas & New Orleans; Mr. Christian succeeding T. G. Beard, who has been appointed assistant general freight agent of all the lines mentioned, in charge of solicitation; and Mr. Anderson succeeding Joseph Hellen, appointed assistant general passenger agent of all the lines. S. G. Reed, assistant general freight agent at Dallas, Tex., has been appointed assistant general freight and passenger agent at that place.

Frank H. Plaisted, whose appointment as assistant to the director of traffic of the Harriman Lines, with office at New York, has been announced in these columns, was born June 9, 1866, at Cincinnati, Ohio. He received a high school education and began railway work on October 7, 1884, with the Kansas City, Fort Scott & Gulf, now part of the St. Louis & San Francisco. On March 20, 1889, he went with the Union Pacific at Salt Lake City, Utah, and was traveling freight agent of that road for nine years from 1892; first at Salt Lake, then at San Francisco, and from April, 1897, when the Oregon Short Line was segregated from the Union Pacific, again at Salt Lake. He was transferred to the Oregon Short Line staff in 1901, and the next year was made district freight and passenger agent at Boise, Idaho. On October 1, 1905, he was appointed assistant general freight agent, with office at Salt Lake City, from which position he was promoted, effective January 1, 1912.

Engineering and Rolling Stock Officers.

The Hine system of organization has been established on the Georgia & Florida. See an item under General News.

J. G. Kelly, master carpenter of the Chicago, Burlington & Quincy at Centerville, Iowa, has been transferred to Beardstown, Ill., succeeding J. O. Thorn, resigned.

W. S. Hanley has been appointed division engineer of the New Orleans Great Northern, with headquarters at Bogalusa, La., succeeding D. L. Cullom, resigned to go to another company.

C. E. Boss, master mechanic of the Fort Worth & Rio Grande at Sherman, Tex., has been appointed master mechanic of the Texas & Pacific, with office at Big Springs, Tex., succeeding J. Potton.

W. H. Harland, Jr., signal engineer of the New York, Ontario & Western, with office at Middletown, N. Y., has been appointed electrical and signal engineer in charge of the maintenance of all electrical equipment and signals.

J. W. Senger, supervisor of materials in the locomotive and car department of the Lake Shore & Michigan Southern at Cleveland, Ohio, has been appointed master car builder, with headquarters at Englewood, Ill., succeeding T. H. Goodnow, resigned to accept service with another company.

T. H. Goodnow, master car builder of the Lake Shore & Michigan Southern at Englewood, Ill., has been appointed general superintendent of shops of the Armour Car Lines, with office at Chicago, succeeding W. E. Sharp, resigned to become vice-president and general manager of the Grip Nut Company.

C. E. Gossett, master mechanic of the Minneapolis & St. Louis, at Minneapolis, Minn., has been appointed general master mechanic, and his authority has been extended over the Eastern division. The authority of P. W. Helwig, general car foreman, Minneapolis, has also been extended over the Eastern division.

J. T. Wallis, whose appointment as general superintendent of motive power of the Pennsylvania Railroad, with headquarters at Altoona, Pa., has already been announced in these columns, was born on June 11, 1868, at New Orleans, La., and was educated in the public schools of his native town, the University of Louisiana (now Tulane University) Georgetown College, and graduated from Stevens Institute with the degree of mechanical engineer in 1891. The same year he entered the service of the Pennsylvania Railroad as an apprentice at the West Philadelphia shops, and was then consecutively assistant road foreman of engines, assistant master mechanic, assistant engineer of motive power, master mechanic, and superintendent of motive power. Mr. Wallis was appointed superintendent of the West Jersey & Seashore on May 1, 1910, which position he held at the time of his recent promotion to general superintendent of motive power as above noted.

J. M. Henry, who was recently appointed master mechanic of the Pennsylvania Railroad at the West Philadelphia, Pa., shops, as has been announced in these columns, was born in 1873, and entered the service of the Pennsylvania Railroad in 1889. He was appointed machinist apprentice in November, 1890, and then entered Purdue University, from which he graduated in 1900. The same year he re-entered the service of the Pennsylvania Railroad in the motive power drafting room at Altoona, and the following year was appointed motive power inspector at Altoona, from which position he was promoted in February, 1909, to assistant engineer of motive power on the Erie & Northern Central division. He was again promoted in July, 1903, to master mechanic at the Elmira, N. Y., shops. He was transferred in the same capacity in April, 1906, to the Sunbury, Pa., shops, and was again transferred as master mechanic on May 1, 1911, to the Olean, N. Y., shop, which position he held at the time of his appointment as master mechanic at the West Philadelphia shops.

J. E. Greiner, consulting bridge engineer of the Baltimore & Ohio, with office at Baltimore, Md., has been appointed consulting engineer of the Chicago Elevated Railways to design an important city and elevated railway bridge over the Chicago river. Mr. Greiner was born at Wilmington, Del., in 1859, and graduated from Delaware College. He began railway work in 1885 as

draftsman on the Baltimore & Ohio, having had some previous experience in outside companies, and in 1889 he was made assistant engineer in charge of bridge designing. From 1893 to 1908 he was assistant chief engineer of the Baltimore & Ohio, and had charge of the design, among others, of the Ohio river bridge at Parkersburg, the Ohio river bridge at Benwood, the Susquehanna river bridge at Havre de Grace, and designed a bridge across the Albemarle Sound, five miles long, for the Norfolk Southern, also a number of other structures. He has at various times been consulting engineer also for the Erie, the Peoria & Pekin Union, and the Kentucky & Indiana Terminal, and has been engaged to design and build a combined steam railway, electric railway and highway bridge over the Ohio river at Louisville, Ky., to cost \$2,000,000.

Henry S. Hayward, whose appointment as consulting engineer of floating equipment of the Pennsylvania Railroad lines east of Pittsburgh, has been announced in these columns, was born on September 19, 1845, at Brooklyn, N. Y., and entered the service of the Pennsylvania Railroad on April 1, 1873, as a machinist and was later draftsman. He was then for one year assistant road foreman of engines, and from April 1, 1875, to October, 1882, he was assistant superintendent of motive power of the United Railroads of New Jersey division, and in October, 1882, was promoted to superintendent of motive power on the same division. Two years later his authority was extended over the West Jersey & Seashore Railroad, which position he held at the time of his recent appointment as consulting engineer of floating equipment as above noted, with headquarters at Jersey City, N. J.

Purchasing Officers.

John H. Guess, whose appointment as general purchasing agent of the Grand Trunk, with office at Montreal, Que., has been announced in these columns, was born near Raleigh, N. C., on February 5, 1878, and began railway work as a telegraph operator in 1895, on the Seaboard Air Line. From May, 1900, to February, 1901, he was clerk to the vice-president and general manager of the Seaboard Air Line, and from February, 1901, to March of the following year was clerk to the vice-president and general manager of the Atlanta, Birmingham & Atlantic. He was appointed assistant general purchasing agent of the National Railroad of Mexico in March, 1902, and in 1905 was made also assistant secretary and assistant treasurer of that company. From September, 1905, to September, 1910, he was general purchasing agent of the National Railroad of Mexico, and its successor, the National Railways of Mexico. Mr. Guess went to the Grand Trunk as assistant general purchasing agent in 1910, which position he



H. S. Hayward.



J. H. Guess.

held at the time of his recent appointment as general purchasing agent of that road.

OBITUARY.

J. A. Duncan, vice-president of the Durham & South Carolina, died on January 12 at Toronto, Can., at the age of 45.

W. W. Lowell, master mechanic of the Chicago, Burlington & Quincy, with office at St. Joseph, Mo., died at that place on January 8.

Guy L. Stewart, agricultural and industrial agent of the St. Louis Southwestern, with office at St. Louis, Mo., was burned to death on Tuesday of this week in a collision at Illmo, Mo.

Goldsborough M. Serpell, general superintendent of the Norfolk district of the Atlantic Coast Line, with office at Norfolk, Va., died recently at that place. Mr. Serpell was born on December 23, 1839, at York, Pa., and was educated at St. John's College at Frederick, Md. He began railway work in 1866, and during the following two years was engineer on the Louisville & Nashville. From 1871 to 1880 he was engineer and master of road on the Baltimore & Ohio, and was later master of transportation and master of road. He was president of the Chowan & Southern from April, 1884, to November, 1899, and during part of this time was president also of the Meherrin Valley, a road which has since been abandoned. When the Chowan & Southern was absorbed, in November 1899, by the Norfolk & Carolina, he became general manager of the latter road, and was later appointed general superintendent of the Norfolk district of the Atlantic Coast Line with office at Norfolk, Va.

George W. Blodgett, formerly and for 23 years electrical engineer of the Boston & Albany, died recently at his home in Lakewood, N. J., at the age of 62. Mr. Blodgett was born at Guildhall, Vt., and was graduated from the Massachusetts Institute of Technology in the class in civil engineering in 1873. He entered the service of the Boston & Albany in 1880 and had charge of the automatic signals on that road before the signal department was organized. The Boston & Albany had a considerable mileage of automatic signals before the profession of signal engineer had come to be recognized. Mr. Blodgett also had charge of the other electrical work of the company and equipped with electric lights, about 1887, one of the express trains running between New York and Boston, which was one of the first, if not the first, train thus lighted in the country. He lectured on electrical subjects at the Massachusetts Institute of Technology, at Cornell and Columbia Universities and in other institutions. He was a member of the Boston Society of Civil Engineers and the American Institute of Electrical Engineers. After leaving the Boston & Albany, Mr. Blodgett was for five years in the engineering department of the Brooklyn Navy Yard, leaving there for New Jersey in 1908 in the interest of the health of his family. He is survived by a widow and two daughters.

FOREIGN RAILWAY NOTES.

Preparations are being made for supplying the Congo Railway and the various steamboats on the Congo river and its tributaries with petroleum for fuel, in spite of the fact that an almost unbroken forest covers the hundreds of thousands of square miles of this territory. A company is laying a pipe line along the old Congo Railway from Matadi to Leopoldville, and storage tanks have already been erected. The change of the locomotives to oil-burners has begun.

A short railway has been open a few years south of Lake Nyassa, Africa, connecting at Port Herald with a navigable tributary of the Zambesi river. In this region an English company has been experimenting with cotton raised from American seed, and also with tobacco. It reports great success with both, and it is now purposed to extend this railway short distances both to the Zambesi river and to the Lake Nyassa, and moreover to build another railway from the north end of the lake northwestward to the south end of Lake Tanganyika, something over 200 miles, which would give an outlet to the navigation on the latter lake, which is more than 400 miles long. Lake Nyassa has British territory on the west, German and Portuguese on the east. It is some 300 miles east of the Indian ocean.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE INTERNATIONAL & GREAT NORTHERN is preparing specifications for 20 locomotives.

THE CENTRAL VERMONT has ordered 4 Pacific type locomotives from the Baldwin Locomotive Works.

THE WABASH will send 20 locomotives to the Lima Locomotive & Machine Company for heavy repairs.

THE NORFOLK & WESTERN has ordered 15 Mallet locomotives from the American Locomotive Company.

THE VIRGINIAN RAILWAY has ordered four superheater Mallet compound locomotives from the American Locomotive Company. The dimensions of the cylinders will be 28 in. x 44 in. by 32 in.; the diameter of the driving wheels will be 56 in., and the total weight in working order will be 540,000 lbs.

CAR BUILDING.

THE BESSEMER & LAKE ERIE has issued specifications for 2,000 gondola cars.

THE TEXAS & PACIFIC is preparing specifications for 20 passenger cars and 200 freight cars.

THE NORTHERN PACIFIC has ordered 1,500 refrigerator cars from the American Car & Foundry Company.

THE PENNSYLVANIA LINES WEST have ordered 1,400 freight cars from the Standard Steel Company.

THE BUFFALO, ROCHESTER & PITTSBURGH has ordered 100 flat cars from the Standard Steel Car Company.

THE INTERNATIONAL & GREAT NORTHERN is preparing specifications for 20 passenger cars and 100 ballast cars.

THE CHESAPEAKE & OHIO is reported to be in the market for 100 box cars. This item has not been confirmed.

THE NEW YORK CENTRAL LINES have ordered four combination passenger cars from the Pullman Company.

THE MERCHANTS' DESPATCH TRANSPORTATION COMPANY, New York, will build 66 refrigerator cars at the company's shops.

THE SPOKANE, PORTLAND & SEATTLE is in the market for 12 first-class coaches, 5 second-class coaches, 4 observation cars and 1 dining car.

THE ROCK ISLAND LINES have asked for bids on the revised specifications for the 700 gondola cars for which they have been in the market.

THE DETROIT & MACKINAC has ordered 35 box cars from the Barney & Smith Car Company and four refrigerator cars from the American Car & Foundry Company.

THE CHICAGO & NORTH WESTERN has ordered 25 steel coaches, 6 steel dining cars, 4 steel parlor cars and 2 observation parlor cars from the Pullman Company and 5 steel coaches and 10 steel smoking cars from the American Car & Foundry Company.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA has ordered 7 steel coaches and 3 steel smoking cars from the American Car & Foundry Company and 4 steel baggage cars and 2 steel combination passenger and baggage cars from the Pullman Company.

IRON AND STEEL.

THE CHICAGO GREAT WESTERN is in the market for 2,000 tons of bridge steel.

THE NORFOLK & WESTERN has ordered 2,000 tons of bridge material from the American Bridge Company.

THE MICHIGAN CENTRAL has ordered 11,000 tons of structural steel from the Jones & Laughlin Steel Company, for the new station at Detroit, Mich.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS has ordered 5,000 tons of rails with the Tennessee Coal, Iron & Railroad Com-

pany, in addition to the 10,000 tons mentioned in the *Railway Age Gazette* of December 29.

THE NEW YORK CENTRAL LINES have ordered 110,000 tons of rails. About half the order will go to the United States Steel Corporation, the majority of the remainder to the Lackawanna Steel Company, and a small portion to the Bethlehem Steel Company. Of this order 64,500 tons are for use on the lines East of Buffalo, N. Y., and 45,500 tons, on lines West of Buffalo.

THE NORTHERN PACIFIC has ordered 36,000 tons of rails, of which 13,000 tons were placed with the Illinois Steel Company, 10,000 with the Colorado Fuel & Iron Company, and the rest divided between the Lackawanna Steel Company, the Bethlehem Steel Company and the Pennsylvania Steel Company.

GENERAL CONDITIONS IN STEEL.—The Steel Corporation is now operating at almost 89 per cent. of its capacity. Large orders are scarce, but the total tonnage is holding up well. Steel consumers are congratulating themselves on having held the prices level thus far, and preventing the advances on finished steel products, which were predicted at the opening of the year. It is generally believed that an increase in prices at present would put an immediate stop to the buying movement. Export business has been very large.

SIGNALING.

The plans of the Chicago, Rock Island & Pacific for the present year, include the erection of automatic block signals on the line from Bureau, Ill., to Peoria, 47 miles; and from Albright, Neb., to Lincoln, 53 miles.

At the Grand Central Terminal, New York City, both of the large interlocking machines in station A are now in use, the 360-lever machine for the upper level having been put in use January 7. The construction of the yards is not yet completed, and for the present only 165 levers of this machine are connected to their functions. The transfer from the temporary machine to the new one in station A was made in 18 minutes.

FOREIGN RAILWAY NOTES.

The Uruguayan minister of public works has almost completed the plans for the 8½ miles of railway which is to be constructed at once along the docks at Montevideo. Contracts for the ties have been signed, while the rails and other materials required have been arranged for. The fireproof warehouses on the wharves are nearing completion, and the whole work should be completed in January, 1912.

The Russian export chamber has had under consideration the question of constructing the Kiahta-Muisova Railroad in Siberia, which line would run 150 miles from Muisova on the Baikal Railroad to the town of Kiahta on the Chinese frontier. The question will be put before the ministerial council for its final decision. This line, if furnished with cold-storage accommodation, may lead not only to supplying all the Russian Far East with meat, but also develop a considerable export of Mongolian meat to European Russia and abroad, Mongolia being a rich cattle-breeding country.

The Yunnan Railway, China, built by the French, in the 112 miles from the border, which is at the junction of the Nzmti river with the Red river, to the plateau, has 75 tunnels, the longest of which is 1,965 ft. long, and 120 viaducts and small bridges, besides three bridges of considerable size. At one place the line reaches a basin in the hills, and there is a distance of a little more than nine miles, having 24 tunnels and a great viaduct over a gorge between two tunnels. Another viaduct 220 ft. long is 260 ft. above the bottom of the valley. At the plateau the line is 4,250 ft. above sea level. Thence to the terminus at Yunnan there is a rise of 2,290 ft. in 184 miles, and there are 82 tunnels and 74 viaducts and bridges on this line. The road is of 3 ft. gage. Trains run about 15 miles an hour, and 17 cars make the longest permissible train. The decaying rocks of the mountains on the line are brought down in great quantities by the summer floods, and in 1910 blocked the line completely for many miles. A thousand coolies worked three months to clear it. The company has a guarantee from the French government.

Supply Trade News.

E. H. Baker has been made second vice-president of the Galena Signal Oil Company, Franklin, Pa.

Edward R. Pool, general manager of the Colorado, Nev., branch of the American Steel & Wire Company, Chicago, died at his residence in Denver, Col., last week.

The Columbia Nut & Bolt Company, Bridgeport, Conn., has added a complete line of hot pressed and cold punched castellated nuts to its line of railway supplies.

The American Locomotive Company, New York, has received an order from the Copper River & North Western for one rotary snow plow with 18 in. x 26 in. cylinders, and a 12 ft. 6 in. cut.

Joseph T. Ryerson & Son, Chicago, have opened a branch office in the Ford building, Detroit, Mich., in charge of J. H. Marlotte. This company has also moved its Minneapolis, Mo., office to 501 Third street, South Minneapolis, where larger floor space has been secured.

William J. Coane, manager of the Philadelphia, Pa., branch of the Joseph Dixon Crucible Company, Jersey City, N. J., and for 25 years with that company, has been made second vice-president and sales manager of the Ajax Metal Company, Philadelphia.

Henry F. Lofland, general manager of the erection department and a director of the American Bridge Company of New York, died at Milford, Del., January 13 of tuberculosis at the age of 48. He had been with the American Bridge Company since its organization. Mr. Lofland graduated from the University of Virginia as a civil engineer.

The George W. Jackson & E. A. Clark Company, consulting engineers, with offices at 754 Jackson boulevard, Chicago, and 228 West Forty-second street, New York, has been organized. Mr. Jackson was formerly president of George W. Jackson, Inc., and Mr. Clark was connected with the same company. The new company will make examinations and reports on subways, tunnels, conduits, water and sewer systems, power plants, mining properties, etc.

C. R. Jamison, for the past five years connected with the Berger Manufacturing Company, Canton, Ohio, has been made sales manager of the Acme Supply Company, Chicago. Mr. Jamison graduated from the civil engineering school of Purdue University in 1905 and completed a post-graduate course in 1908. In 1906 he was masonry inspector of the Cleveland, Cincinnati, Chicago & St. Louis, and later was assistant engineer in the testing department of the United States Geological Survey at St. Louis, Mo.

The Spencer Otis Company, Chicago, has recently moved its main office to room 747 Railway Exchange building, Chicago, where a new feature has been introduced in the way of exhibiting several of the company's devices. The American Kron scale for railway work is exhibited in all sizes and capacities, the Au-Tra-Kar for boring holes and driving screw spikes is set up under power together with several other gasoline-propelled cars for railway work. This company will shortly open an office in San Francisco, Cal.

Henry C. Valentine, president of Valentine & Company, New York, varnish manufacturers, died at his home in New York January 15, at the age of 82. Mr. Valentine came to New York from Cambridge, Mass., where he was born, and went into business with his older brother, the late Lawson Valentine. Mr. Valentine was made president of his firm in 1882, and remained at its head until 1900, when he was made chairman of the board of directors. In 1909, owing to failing health, he retired from business. Mr. Valentine was a member of the Union League Club and the New England Society.

TRADE PUBLICATIONS.

RAIL PLANERS.—The Vixen Tool Company, Chicago, has issued a catalog describing the Vixen rail planer for use in removing cupped joints and corrugations from rails.

Railway Construction.

New Incorporations, Surveys, Etc.

ALABAMA & NORTHWESTERN.—Incorporated in Alabama with \$160,000 capital. The company owns a line from Pine Hill, Ala., northwest to Sweet Water, in Morengo county, about 20 miles. J. T. Cochrane, president; William Toxey, chief engineer, and P. C. Pyre, superintendent, Pine Hill.

CENTRAL ILLINOIS.—Incorporated in Illinois with \$25,000 capital, and headquarters at Aurora. The plans call for building from Chicago west through the counties of Cook, DuPage, Kendall, LaSalle, Bureau, Henry and Rock Island to Muscatine. The incorporators include G. A. Ackerman, Kaneville; J. M. Raymond, Aurora; W. E. Williamson, Marseilles; H. Hoganson, Seneca, and L. A. Fruland, Ottawa.

ERIE RAILROAD.—This company, which leases the New Castle branch of the Sharon Railway Company, will carry out the improvements arranged by the latter several years ago. This includes a double track line from Pymatuning, Pa., to New Castle, 30 miles, and building a roundhouse at Ferrona.

FAIRCHILD & NORTHEASTERN.—According to press reports this company will build an extension from Fairchild, Wis., west to Eau Claire and Dunn counties, about 30 miles. W. Foster, vice-president and general manager, Fairchild. (December 1, 1911, p. 1148.)

GRAND JUNCTION-PARADOX DEVELOPMENT.—This company, with headquarters at Grand Junction, Colo., has made preliminary surveys for a railway from Grand Junction through the Unaweep canyon to Gateway, thence to Bedrock, about 80 miles. It is expected that the permanent survey will be made in March as far as Paradox. The line is to be extended eventually to Farmington, N. M., and can be built with less than 2 per cent. grades, except on a section of about one mile and a quarter, where the grade will probably be about 2½ per cent. The company expects to develop a traffic in agricultural products, live stock and ore. Thos M. Todd, president; Karl A. Bickel, secretary; William Campbell, treasurer, care of the Grand Valley Bank, Grand Junction.

GRAND TRUNK.—According to press reports, Foley, Welch & Stewart, who have the contract for work on the section from Tete Jaune Cache, B. C., west to Ft. George, are planning to have the work finished by next fall. Sub-contracts have been let as follows: H. E. Carlton & Co., Edmonton, 25 miles west from Tete Jaune Cache; Burns, Jordan & Company, Spokane, Wash., 50 miles, and Sims Brothers & Keary, St. Paul, Minn., 75 miles. There remains about 30 miles yet to be sub-let on this section.

LAKE ERIE & OHIO.—Under this name a company is to be organized at Wellston, Ohio, with a capital of \$8,000,000, to develop southern Ohio timber and coal lands, and to build a railway from Portsmouth, Ohio, to a point near Sandusky. B. F. Howland and C. F. Butterfield of New York, and E. V. Lingham, Toledo, are back of the project.

MAINE CENTRAL.—The Rangeley Lakes & Megantic, which was organized to build from Oquossoc, Me., north to the International boundary, will build the ten-mile section from Oquossoc to Kennebago. T. L. Dunn, chief engineer, Portland, Me.

MISSOURI, ARKANSAS & GULF.—An officer writes that a contract has been given to E. E. Young & Co., Rolla, Mo., to build from Rolla south via Lecomia, Licking, Oscar, Stutz, Willow Springs and West Plains to Bakersfield, 125 miles. Maximum grades will be 1½ per cent., maximum curvature 6 deg. The heaviest work will be on a 12 ft. cut and fill on the first 80 miles. The company expects to develop a traffic in timber products, live stock, farm products and minerals. Gilbert Lay, president, St. Clair, Mo., J. B. Payne, chief engineer, Rolla.

MISSOURI, OKLAHOMA & GULF.—According to press reports, this company has taken out a new charter in Oklahoma to build the extension from Henrietta, Okla., west to Oklahoma City, 102 miles, and other proposed extensions. It is understood that contracts will be let for the Oklahoma City line in the near future. J. J. Harrison, chief engineer, Muskogee, Okla. (November 24, 1911, p. 1080.)

NEW YORK SUBWAYS.—A contract has been given to the Underpinning & Foundation Company, New York, at \$2,295,000, to build section 3 of the Broadway-Lexington avenue subway, in the borough of Manhattan. This work is under Broadway, and extends from Howard street to a point midway between Houston and Bleecker streets.

NORTH BUFFALO RAILROAD.—Incorporated in New York with \$100,000 capital. The company will operate a line between Harriet, N. Y., and Tonawanda, Erie county. The incorporators' names are not given.

OREGON SHORT LINE.—An officer writes that the Oregon Eastern is now building from Vale, Ore., southwest through the Malheur river canyon to a point near the north shore of Malheur and Harney lakes, in Harney county. Grading work has been started, but no track has yet been laid. The Utah Construction Company, Ogden, Utah, has the grading contract. There will be 27 steel bridges, aggregating 4,305 ft., also two tunnels aggregating 2,640 ft. The line is being built under the direction of W. H. Bancroft, vice-president and general manager, and Carl Stradley, assistant general manager, will be in charge of the construction work.

OREGON EASTERN.—See Oregon Short Line.

RANGELEY LAKES & MEGANTIC.—See Maine Central.

STATESVILLE AIR LINE.—An officer writes that grading has been finished on about eight miles between Statesville, N. C., and Mt. Airy. The route is via Yadkinville, Booneville and Dobson, maximum grade will be 1½ per cent, maximum curvature 6 deg. There will be five steel bridges, of a total length of 700 ft., and seven small trestles. R. L. Greenlee, Statesville, may be addressed.

TIDEWATER & SOUTHERN (Electric).—An officer writes that contracts have been let to the Daae Construction Company, Sacramento, Cal., and work is now under way from Stockton via Modesto and Ceres to Turlock, 50 miles. Grading is nearly completed, and work is now under way on the trestles. Track has been laid on 5 miles. There will be two steel bridges, each 125 ft. long, and two steel bridges each 150 ft. long. J. H. Wallace, chief engineer, Stockton, Cal. (December 15, 1911, p. 1259.)

UTAH ROADS.—A line is projected from the Black Hawk mining district to connect with the Denver & Rio Grande at Wellington, Utah, about 12 miles. David Eccles, Ogden, may be addressed.

WINNIPEG, SALINA & GULF.—This company has been granted authority in Kansas to issue bonds for building 1,080 miles of railway. The company was incorporated in Kansas in 1909, and the plans call for the construction of a north and south line from Winnipeg, Can., to the Gulf of Mexico, with a cross line from Kansas City, Mo., to Des Moines, N. M. It is proposed to carry out the work first on a section from Omaha, Neb., to Oklahoma City, Okla., and on the cross line from Kansas City, Mo., to Des Moines, N. M. H. Leon Miller, Salina, Kan., president. (January 12, 1912, p. 77.)

RAILWAY STRUCTURES.

ANDERSON, S. C.—See Greenville, S. C.

BATON ROUGE, LA.—Plans have been prepared for a \$10,000 addition to the freight station of the Yazoo & Mississippi Valley.

BELTON, S. C.—An officer of the Piedmont & Northern writes that a contract has been given to Wilkinson & Moffett, Durham, N. C., to put up a combined freight and passenger station at Belton, 30 ft. by 60 ft., to cost \$7,000. The building will be of white brick construction with tile roof. Contracts have also been let to the same firm to put up similar stations at Donalds, Hodges and Honea Path.

BOYLES, ALA.—The new shops of the Louisville & Nashville at Boyles, which have been under construction for about two years, were recently opened for business. The cost of the improvements was about \$1,000,000. (April 21, 1911, p. 972.)

CENTRALIA, WASH.—The Northern Pacific is to begin work at once on the construction of a large roundhouse and machine shops.

CHICAGO, ILL.—The Chicago Elevated Railways is having plans

made for putting up a combined city and elevated railway bridge over the Chicago river.

CINCINNATI, OHIO.—A meeting of the executive officers of the roads entering the city was held on January 9 to discuss plans for the proposed new union station, provided for in the city ordinance recently passed. Owing to some changes in the final draft of the ordinance, no action was taken pending a report of the railway engineers as to the cost of the structure.

CONFLUENCE, PA.—See Ohio Pyle, Pa.

DONALDS, S. C.—See Belton.

ELKHART, IND.—The Cleveland, Cincinnati, Chicago & St. Louis proposes to build a new enginehouse this year at Elkhart, Ind., also one at Carey, Ohio, and one at Terre Haute, Ind.

FERRONA, PA.—See Erie Railroad under Railway Construction.

FROSTBURG, MD.—See Ohio Pyle, Pa.

GARRETT, PA.—See Ohio Pyle, Pa.

GREENVILLE, S. C.—An officer of the Piedmont & Northern writes that a contract has been given to the Goode Construction Company, Charlotte, N. C., to put up a one-story freight house 40 ft. x 240 ft., at Greenville, to cost \$18,000. The building will be of white brick construction with tile roof. A contract to put a similar building at Anderson has also been let to the same company.

HODGES, S. C.—See Belton.

HONEA PATH, S. C.—See Belton.

LATHROP, ORE.—The Southern Pacific will build a new passenger station at Lathrop.

MASON CITY, IOWA.—The Chicago, Rock Island & Pacific, and the Chicago Great Western have secured property on which to erect two new freight stations and a joint passenger station.

MEMPHIS, TENN.—An officer of the Rock Island Lines advises that a bill has been introduced in Congress to authorize the erection of a bridge across the Mississippi river at Memphis, for the use of the Rock Island. The bridge will be in the vicinity of the present St. Louis & San Francisco bridge. No plans have been made for the structure, but after the bill has passed Congress work will be started promptly, and it is hoped to begin construction some time next summer. (January 12, p. 77.)

MYERSDALE, PA.—See Ohio Pyle, Pa.

OHIO PYLE, PA.—The Western Maryland has given contracts, it is said, for putting up stations at Ohio Pyle, Confluence, Rockwood, Garrett and Myersdale, in Pennsylvania, and at Frostburg, Md. It is understood that the six stations will cost \$50,000. These are to be built on the new line between Connellsville, Pa., and Cumberland, Md.

PQUA, OHIO.—The Pennsylvania Lines have submitted to the city council plans for elevating their tracks through the city and building a new station.

ROCKWOOD, PA.—See Ohio Pyle, Pa.

RUSHVILLE, IND.—The Indiana railway commission has ordered the Pennsylvania Lines to build a new passenger and freight station.

SACRAMENTO, CAL.—The Central California Traction Company has plans made for building a large freight house in the Oakpark section, Sacramento.

SPOKANE, WASH.—Plans are being worked out for a large new union station to be erected by the Chicago, Milwaukee & Puget Sound and the Oregon-Washington Railroad & Navigation Company.

VALE, ORE.—See Oregon Short Line under Railway Construction.

VIDALIA, GA.—According to press reports a contract has been let to build a union passenger station for the Georgia & Florida, the Seaboard Air Line, and the Macon, Dublin & Savannah, at Vidalia. The cost of the improvements will be about \$15,000. (July 28, p. 200.)

YARDLEY, WASH.—The Northern Pacific is about ready to let a contract for new shops, and a 56-stall roundhouse.

Railway Financial News.

BOSTON & MAINE.—See Fitchburg Railroad.

BUFFALO & SUSQUEHANNA.—Gustavus Babson, of Chicago, a holder of the B. & S. Railroad 4 per cent. bonds and the B. & S. Railway 4½ per cent. bonds, in a letter to other bondholders, says in part: "The writer has just returned from an inspection of the property and is more convinced than ever that its only salvation is the purchase of more coal lands near Du Bois and the inauguration of a selling system which will dispose of the large tonnage of coal. While the receivership has done everything that proper railway management can do, it has taken out 2,000,000 tons of coal, thereby reducing our assets just that much. After four or five years the property will, I believe, be so gutted that it will not more than pay operating charges."

"How dependent the property is on its coal is shown as follows: Ninety per cent. of all its freight traffic is its own freight or freight for the consumption of its employees. The entire road passes through a country of non-agricultural possibilities, being barren, mountainous and cut over lumber lands. The timber has practically all been cut and in five years will be exhausted. Built to get lumber, the road has excessively bad grades and curvature. Between Buffalo and Du Bois it is 40 miles longer than its competitor, the B. R. & P. (a first class railway) and crosses two summits on 3 per cent. grades with switchbacks and 20-deg. curves. The B. & S. lost outright in the Austin disaster \$75,000, and at this station, which was probably the best paying office on the entire line, the monthly receipts, formerly \$15,000, are now trifling, as the saw and pulp mill were both destroyed."

CANADIAN PACIFIC.—It is said that this company has sold £1,000,000 (\$5,000,000) 4 per cent. preferred stock and £1,000,000 (\$5,000,000) debenture stock in London.

The Canadian Pacific has leased the South Ontario & Pacific for 999 years, beginning January 1, 1912.

CENTRAL CALIFORNIA RAILWAY.—See Southern Pacific.

CHICAGO & EASTERN ILLINOIS.—The *Commercial and Financial Chronicle* quotes B. F. Yoakum as confirming the report that Kuhn, Loeb & Co., New York, have become the bankers for the C. & E. I.

CHICAGO & NORTH WESTERN.—This company has asked the railway commissions of Wisconsin, Michigan and Nebraska for permission to issue \$15,000,000 4 per cent. bonds to finance the Milwaukee, Sparta & North Western, principal and interest to be guaranteed by the C. & N. W. Presumably the bonds will be issued under the general mortgage due 1987.

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY.—Speyer & Co., New York, have bought \$20,000,000 5 per cent. debentures of 1911-1913. The *Railway* is the operating and owning company, nearly all of whose stock is owned by the *Railroad*, which in turn is controlled by the Rock Island Company. The proceeds of the debenture sale will be used for terminal improvements at Omaha; new terminals and a bridge across the Mississippi river at Memphis; for additions and betterments, and to pay at maturity securities falling due in 1912 and 1913. There are approximately \$1,494,000 series J and an equal amount of series K of the Choctaw purchase money 4 per cent. bonds falling due in the next two years. The first and refunding bonds and any terminal securities issued during these two years under the terms of the mortgage are not to be sold but will be taken in to the *Railway* company's treasury.

FITCHBURG RAILROAD.—The New York Public Service Commission, Second district, has authorized the Fitchburg Railroad to issue \$1,200,000 4½ per cent. bonds at not less than par. Of the proceeds, \$100,000 will be used to refund bonds of the Fitchburg Railroad and the remainder will be paid to the Boston & Maine to reimburse it for payment for improvements and betterments under the lease.

GRAND TRUNK.—A press despatch from Wheeling, W. Va., the accuracy of which cannot be confirmed from the railway company, says that the Grand Trunk has bought 21,000 acres of coal land on the Ohio River & Western Railroad, which runs

from Zanesville, Ohio, to Bellaire. The price paid is said to be \$87 per acre.

LEHIGH VALLEY.—The directors have declared an extra dividend of 10 per cent. calling for the payment of \$6,060,800. Stockholders have the option of receiving cash or stock at par of the Lehigh Valley Coal Sales Company, a new company which has been formed with \$10,000,000 stock, of which \$6,060,800 is to be issued immediately. Drexel & Co., Philadelphia, have underwritten the sale of this selling company's stock.

Henry B. Coxe has been elected a director, succeeding P. A. B. Widener, who declined re-election.

NEW ORLEANS, MOBILE & CHICAGO.—Henry Walters, of the Atlantic Coast Line and the Louisville & Nashville, has been elected chairman of the board of directors of the N. O. M. & C. Milton H. Smith, of the Louisville & Nashville; B. F. Yoakum, of the St. Louis & San Francisco; W. F. Owen; B. L. Winchell, of the St. Louis & San Francisco; W. L. Mapother; C. W. Hillard, of the St. Louis & San Francisco, and J. H. Ellis have been elected directors, succeeding Elisha Walker and Alonzo Potter, both of William Salomon & Co.; E. D. Pray, William C. Sheldon, C. W. Jester, E. K. Stallo and S. Wexler.

NEW YORK CENTRAL & HUDSON RIVER.—The New York Public Service Commission, Second district, has authorized the N. Y. C. & H. R. to issue \$5,000,000 3½ per cent. bonds of 1897-1997, to be sold at not less than 86. These bonds are to be issued in lieu of the \$5,000,000 notes authorized by the commission in March, 1911, the proceeds of which were to be used in connection with the purchase of the New York & Hartford Railroad.

NORFOLK & WESTERN.—Stockholders are offered the privilege of subscribing at par up to March 1, 1912, to 4 per cent. convertible bonds of 1912-1932, equal to one-eighth of their respective holdings of stock. The bonds are convertible at par into common stock.

PACIFIC RAILWAY & NAVIGATION.—The Southern Pacific has bought this road, which runs from Hillsboro, Ore., to Tillamook, 90 miles.

ST. LOUIS SOUTHWESTERN.—A. J. Hemphill, president of the Guaranty Trust Co. of New York, has been elected a director and a member of the executive committee, succeeding Howard Gould.

SOUTH ONTARIO & PACIFIC.—See Canadian Pacific.

SOUTHERN PACIFIC.—The Central California Railway, which is leased to the Southern Pacific, has increased its capital stock from \$1,000,000 to \$5,000,000. The money to be raised by the sale of the additional stock is to be used to pay for the extension from Dumbarton bridge to Redwood City.

VIRGINIAN RAILWAY.—There has been a rumor, confirmation of which is refused, that the directors will ask stockholders, at the special meeting on January 27, to authorize an increase in the capital stock from \$36,000,000 to \$65,000,000 through an issue of \$29,000,000 5 per cent. cumulative preferred.

WABASH.—Arthur Coppell, of Maitland, Coppell & Co., has been elected a member of the stockholders' protective committee.

WISCONSIN & MICHIGAN RAILWAY.—Frank McKey has been appointed receiver of this company on the application of the Otto Gas Engine Co. The road runs from Iron Mountain, Mich., to Peshtigo, Wis., 76 miles.

An agreement has been concluded between the Chinese and Japanese commissioners at Mukden, Manchuria, regarding the extension of the tracks of the Peking-Mukden line across the tracks of the South Manchurian Railway and the removal of the Mukden station of the former railway from its present position to the end of the proposed extension. The Chinese government agrees that the Peking-Mukden Railway administration shall build a line between the proposed new station and the station of the Manchurian Railway, in order that the lines may make good connections and thereby extend traffic. The Japanese government agrees that the South Manchurian Railway shall raise an embankment and build a bridge over the extension of the Peking-Mukden line at the point of intersection of the two roads.